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SNAKES FROM THE UPLANDS OF THE CANAL ZONE AND OF DARIEN

BY E. R. DUNN AND JOSEPH R. BAILEY

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM
OCTOBER, 1939

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No. 1. — *Snakes from the Uplands of the Canal Zone and of Darien*[1]

By E. R. Dunn and Joseph R. Bailey

We report on 268 snakes from the uplands of eastern Panama gathered in 1936 to 1938 through the initiative of Dr. H. C. Clark, Director of the Gorgas Memorial Institute in Panama City. These add three genera and five species to the fauna of North America, eight species to that of Panama, and ten species to that of eastern Panama. Specimens of each species are deposited in the Museum of Comparative Zoölogy. We have examined, and include in this report, the only snakes previously taken from these uplands: twenty in the United States National Museum, and eight in the Museum of Comparative Zoölogy, so that we have seen, in all, 296.

We are indebted to Dr. Clark, Dr. Stejneger, and Dr. Barbour for the opportunity to examine these snakes.

Darien uplands. Major Goldman, in 1912, took 18 snakes at the Cana Mines (2000 feet), and on the Pirri Range above Santa Cruz de Cana. He has given a general account of the region (1920: 10–15). His snakes are in the National Museum and have been reported on by Amaral (1923), and by Schmidt (1933).

Dr. Barbour and Mr. Brooks, in 1922, took a snake on Mt. Sapo, Garachiné Peninsula (elevation 1200–1500 feet, Barbour *in litt.*). The specimen is in the Museum of Comparative Zoölogy (cf. Barbour 1923, Barbour and Brooks 1923).

Dr. Clark has sent 153 snakes from Cana, collected by natives.

Canal Zone uplands. Major Goldman, in 1911, took two snakes on Cerro Bruja, at about 2000 feet. He gives an account of conditions in the mountains surrounding the Chagres basin (l.c.). His snakes are in the National Museum and have been reported on by Schmidt (1933).

Captain Stewart, in 1926, took seven snakes while surveying the Bruja Mountain part of the divide of the Chagres basin. His snakes are in the Museum of Comparative Zoölogy, and were reported by Barbour and Amaral (1928).

Dr. Clark has sent 115 snakes from the uplands of the Chagres basin.

The main divide of the Chagres basin had been mapped by January 1927 (official Canal Zone Map) as far as 79 degrees 45 minutes west longitude in the north (including the Bruja Mountains) and as far as 79 degrees 29 minutes west longitude in the south. In 1936 this mapping was completed, and surveys were made along the major ridges

[1] Contributions from the Department of Biology, Haverford College, No. 36.

of the basin, the work being entirely to the east of the former mapping. Dr. Clark obtained the cooperation of Mr. R. B. Kirkpatrick, Chief of Surveys, and that of the leaders of the various parties.

Mr. W. M. Sargent, head of "B" party, was especially interested. His party took 78 snakes, on most of which we have detailed field data. Four of these were taken on the Caribbean slope, while attaining the main divide from the north.

The other parties took 37 specimens. Five have no data, and many have simply "E" party. This outfit worked up the Piedras and along the Piedras-Pacora ridge. As the Piedras enters the Chagres at 500 feet elevation, this is a minimum elevation for "E" party snakes. The harmless snakes are said to have come from the "valley of the Piedras."

Of the 115, a single specimen is from 200 feet and eight are from 350–495. In all probability the rest are from over 500 feet. Twenty-six (including the nine just mentioned) are from below 1000 feet; 53 are from 1000–2000 feet; 17 are from 2000–3000 feet.

The 115 specimens were collected by the men of the surveying gangs, "82 men on the ridges for three months and travelling in a line on the ridges, making a new camp each night" (Grayson, Crowell, and Clark, 1937: 18).

The localities mentioned are:

Cerro Bruja, 934 m., or about 3200 feet. Northeast part of divide.

Rio Miramar, enters Caribbean near Nombre de Dios.

Rio Cuango, enters Caribbean just east of Rio Miramar.

Rio Pequeni. With the more westerly Boqueron the two main northern tributaries of the Chagres. The two meet and empty into the Chagres in the Madden Dam area.

Rio Adee. Eastern tributary of Pequeni.

Rio Chico. First large northern tributary of Chagres above Madden Dam area.

Rio Piedras. Enters Chagres from south above mouth of Chico. The most southern tributary.

Piedras-Pacora ridge. Separates Chagres basin from that of Pacora, which enters the Pacific.

Rio Limpio. Enters the Chagres from north, above mouth of Piedras.

Rio Esperanza. A very large stream which enters Chagres from north, above mouth of Limpio.

Pequeni-Esperanza ridge. Extends northeast-southwest, dividing Chagres system into a southern Chagres-Esperanza basin and a northern and western Pequeni-Boqueron basin.

Tres Hermanas Quebrada. Enters Esperanza from the north.

Playa Grande. Enters Esperanza from north above mouth of Tres Hermanas.

Upland Versus Lowland Material

The 296 upland snakes represent 59 species: 19 from only the Chagres ridges, 22 from only upland Darien, and 18 common to the two areas.

The senior author has examined all available snakes from the lowlands of the Canal Zone and eastern Panama. He is aware of 28 in Turin which he has not seen, but these add no species to the 64 lowland forms he has seen. The lowland material amounts to 7961 specimens with definite data, 7021 of which have been sent by Dr. Clark in the last six years (1933–38).

The upland material of 296 specimens contains 16 forms not known from the lowlands. We list these here, adding the other areas from which they are known.

Four are endemic:

Atractus clarki spec. nov. from Cana.
Rhadinaea decorata ignita from Cana.
Rhadinaea sargenti spec. nov. from the Chagres ridges.
Micrurus stewarti from the Chagres ridges.

Four are North American only in upland Darien:

Atractus crassicaudatus? Colombia and Venezuela.
Trachyboa boulengeri. Western Colombia and western Ecuador.
Trypanurgos compressus. Bolivia, Brazil, the Guianas, Trinidad, Colombia.
Trimeresurus montecelli. Western Colombia and western Ecuador.

Seven are eastern Panamanian only in the Chagres ridges:

Ungaliophis panamensis. Atlantic Nicaragua.
Nothopsis rugosus. Atlantic Nicaragua, Atlantic Costa Rica, Pacific Ecuador.
Sibon temporalis. Western Colombia and western Ecuador.
Oxybelis brevirostris. Atlantic Nicaragua, Atlantic Costa Rica, Atlantic Veragua, western Colombia, western Ecuador.
Imantodes inornatus. Near Matagalpa, Nicaragua; Atlantic Costa Rica; Chiriqui.
Tantilla schistosa. "Mexico"; Alta Vera Paz, Guatemala; "Honduras"; near San Jose, Costa Rica.
Trimeresurus nummifer. Mexico, Guatemala, Honduras, Nicaragua, Costa Rica.

One is Panamanian only on the Chagres ridges and at Cana:

Tantilla annulata. "Nicaragua," Atlantic Costa Rica.

The majority of these snakes are elsewhere inhabitants of "rain-forest" areas, which have no dry season. We know of only four snakes (of three species) from this sort of area on the Atlantic coast of Eastern Panama. We expect that most of these "upland" snakes will be found there when that coast is properly worked.

The snake fauna of the Chagres ridges (37 species) has more affinity with that of the lower Chagres basin than with any of the other known lowland areas. It has eleven species restricted to the uplands and 23 in common with the lower Chagres. The three not accounted for are: *Ninia atrata,* which is not uncommon in the lower Tuira valley in Darien; *Rhinobothryum bovallii* and *Drymobius rhombifer,* both rather rare in the Panama Sabanas area and in the lower Tuira.

The snake fauna of Cana has its greatest affinity with that of the lower Tuira. Cana has six species restricted to the uplands, the other 34 being all known from the lower Tuira.

Since the two upland areas have only 18 species in common, it is obvious that the Ridge fauna is more of the Atlantic slope type and that of Cana more of the Pacific slope type.

List and comments

Ungaliophis panamensis Schmidt

Cerro Bruja, 2000 feet, U.S.N.M. 54059, type. This form is otherwise known only from the Misterioso River, 10 miles from Greytown, Nicaragua, U.S.N.M. 29215. The name Peropodum, sometimes used for this genus, is a form of the group name Peropoda, and is no more of a generic name than Avium, Mammalium, etc.

Trachyboa boulengeri Peracca

A female from Cana introduces the species and the genus to the North American fauna. It has no anal spurs; 33 dorsal scale rows, the vertebral and three rows on each side keeled, the four rows below these nearly smooth, eight lateral rows very strongly keeled with the keels running obliquely in the more dorsal of them; lowest row smooth; 134 ventrals; 21 caudals; eye separated from labials by suboculars; horns on internasals and supraoculars. The species has been recorded from localities in northwestern Ecuador and in western Colombia.

Constrictor constrictor imperator (Daudin)

Cana, USNM 50094.

Epicrates cenchria maurus Gray

Cana, five specimens.

Boa enydris cookii (Gray)

Cana, three specimens.

Nothopsis rugosus Cope

A female from "ridge at headwaters of west branch of Rio Cuango . . . . 700 feet." It contained a specimen of *Oedipus parvipes* in its stomach. Dorsals 29, rows 7–10 smaller; ventrals 161+1; caudals 95 pairs; upper and lower labials both 13; sixth supralabial below eye; a pair of internasals; a trace of right prefrontal; paired areas represent frontal and parietals; paired anterior geneials; otherwise the head is covered with tiny granular scales; length 213 mm.; tail 61.

Specimens are now known from: San Juan River, Nicaragua (USNM 19562); Cariblanco, Costa Rica (BMNH 1905–1–30, 51); Reventazón, C. R. (MCZ 15269); "Atlantic side of Isthmus of Darien" (USNM 12427, TYPE); Salidero, Ecuador, 350 feet (Boulenger 1905, TYPE of *N. affinis* Boulenger).

As *Oedipus* are terrestrial salamanders and as the specimen was taken on a "ridge," this, the only information we have on the habits of *Nothopsis*, provides a strong contrast to the highly aquatic habits of its Asiatic relatives.

Ninia atrata (Hallowell)

Cerro Bruja (MCZ 24928–9). Cana, two specimens. A male has 143 ventrals and 55 caudals; the loreal enters the eye, but there are tiny preoculars, two lower and one upper on the left side, one lower on the right. This species, whose range includes Trinidad, Venezuela, Ecuador and Colombia, is not uncommon in the lower Tuira basin. It is also known from Cariblanco and from Cartago, Costa Rica.

Ninia maculata (Peters)

Cana (USNM 50114, *Ninia atrata sebae* Schmidt, p. 14). This specimen was erroneously recorded from Gatun by the senior author in 1935. Of three that we have from Cana, a male and a female have tiny preoculars on each side below the contact of the loreal and the eye. The male has 143 ventrals, 62 caudals; the female 142 ventrals,

54 caudals. The species is not known south of Darien. A single specimen has been seen from the lower Tuira Valley (Yavisa), and this has two preoculars on each side, excluding the loreal from the orbit. Since preoculars are unknown in more northern specimens of this species, their presence in three out of five Darien specimens is significant.

Atractus cf. crassicaudatus Duméril and Bibron

A single head, sent in 1936 from the Piedras-Pacora ridge, introduced the genus to North America (the so-called Mexican Atractus are really Geophis). We have compared it with topotypes of *crassicaudatus* from Bogotá, and have examined a number of other specimens. This head has four lower labials in contact with the geneials. We have been unable to find a Colombian specimen with more than three in contact. Other characters of scalation and markings are within the range of variation of Colombian *crassicaudatus*, although it may be pertinent to state that ours has a long slim scale in the upper secondary temporal row, whereas in 21 topotypes this character appears on both sides in one and on one side in four, the others having two or more scales in this area; and that ours has a black postocular streak across the last upper labial, while the topotypes have it across the next to last. Ours has two preoculars on the left side, three on the right, a tiny lower scale being present; seven upper labials 3rd and 4th in orbit; seven lower labials; temporals 1–2, upper of posterior set very long; 17 dorsals; mental and geneials separated by contact of first lower labials; loreal thrice as long as high.

Atractus clarki spec. nov.

Type. M.C.Z. 28800, female, collected in 1938.

Type locality. Mine at Santa Cruz de Cana, Darien.

Diagnosis. An Atractus with 17 dorsals; mental and geneial separated by contact of first lower labials; loreal thrice as long as high; 7 upper labials; 2 postoculars; prefrontals longer than wide; dark, lower scale rows lighter and belly immaculate; 185 ventrals; 33 caudals.

Description. Besides the characters given in the diagnosis the specimen has: 3rd and 4th upper labials in orbit; three lower labials contacting geneials, temporals 1–2, the upper second extending to tip of parietals; dorsal scales black, except lowest three which are progressively lighter in the center, so that there is a light line along scale row two; throat and belly immaculate except for a faint dark mark on tip

of ventrals; upper labials light except for a dark streak from eye across labial 6; throat color extends up onto labial 7 and temporals; length 313 mm., tail 35. The specimen has been cut in half, so that measurements and count of ventrals is approximate and minimum.

Remarks. This form is one of the great mass of Atractus species, with 17 dorsals, seven upper labials, two postoculars, and elongate loreals. At least fifteen of these have been reported from Colombia, differing in color, in ventral and caudal count, and in proportions of the head scales. Of these Colombian forms, *pamplonensis* Amaral, from Pamplona near the Venezuelan border, is much the most similar, both in scalation and in color. It has a double series of small black paravertebral spots; the tips of the ventrals are much more definitely marked with black; the highest female ventral count is 184; the highest female caudal count is 24 (the highest male count is 30); the second upper temporal is short. These are the characters in which *pamplonensis* differs from *clarki*. Of the other Atractus known to us, *collaris* Peracca, from Cononacco, near Iquitos, Peru, has a quite similar body color, but the temporal patches are much more marked, and the ventrals are only 163.

Sibon temporalis (Werner)

A head from "Pequeni-Chagres ridge between headwaters of Rio Limpio and Las Tres Hermanas Quebrada;" a head from "E party." Dorsals 15, vertebral enlarged; supralabials 7, 4–5–6 in eye; loreal entering eye; an upper preocular; postoculars 2–3; lower labials 8, anterior not in contact; anterior pair of geneials tiny, followed by three pairs of normal geneials; 3 anterior temporals.

We think that this species, described from Esmeraldas, Ecuador (Werner 1909) and *spurrelli* (Boulenger 1913) from Peña Lisa, Condoto, Chocó, Colombia, 300 feet, are the same. Werner's specimen had one of the two anterior temporals entering the eye between the two postoculars. Boulenger *says* his specimen had no preocular and seven upper labials. His figure shows an upper preocular and eight upper labials, as well as three anterior temporals. The type of *temporalis* had 206 ventrals and 125 caudals; the type of *spurrelli* had 208/132. Werner and Boulenger both remark, and we can confirm them, that this form is very similar to *S. annulata* of western Panama, Costa Rica, and Nicaragua.

Sibon viguieri (Bocourt)

Cana, USNM 50112.

Sibon sibon (Linné)

Cana, USNM 50117. We have a female from Cana: dorsals 15–13, the paravertebrals dropping just anterior to the vent, vertebrals wider than long, paravertebrals enlarged; ventrals 184; navel at 158–9; caudals 89; supralabials 7, 4th and 5th in eye; postoculars 1; temporals 1–2.

Rhadinaea pachyura fulviceps Cope

Cana, USNM 50121.

Rhadinaea decorata decorata (Günther)

Bruja Mountains, MCZ 24930. We have one from the Pequeni-Esperanza ridge near the head of the Adee at 1300 feet.

Rhadinaea decorata ignita (Cope)

Two females from Cana. Two preoculars; subpreocular present on both sides in one, absent in the other; former has 124 ventrals, 99 caudals; latter has 121 ventrals.

Typical *decorata* from Mexico to western Panama inclusive always has a light streak back of the eye, a light spot on the nape, a light dorsolateral line on the anterior part of the body. The Cana specimens have these three light markings fused into a single line, on either side, as do the types of *ignita* (USNM 24501–2, from "Atlantic side of Isthmus of Darien"). Specimens from the lower Chagres basin show every possible transition between the two types of coloration, but a strong majority are of the northern type. The two from the uplands of the Zone are of the northern type. In these circumstances we prefer to retain *ignita* as a racial name for the southernmost specimens of *decorata*.

Rhadinaea sargenti spec. nov.

Type. MCZ 42788, adult male, collected by Sargent's party.

Type locality. Pequeni-Esperanza ridge near head of Pequeni, 1800 feet.

Range. 1000–2530 feet elevation on ridges of Chagres basin.

Diagnosis. A Rhadinaea with 17 dorsals; 118–126 ventrals; 67–72 caudals; 8 upper labials; a broad black band on the lower scale rows; labials with black borders; top of head with a pattern of interlacing light black-bordered lines.

Description. The collection contains six specimens:

Pequeni-Esperanza ridge	near head of Pequeni,	1000	feet,	MCZ	42787
"	"	1800	"	"	42788
"	"	2000	"		head
"	near head of Adee	1300	"	"	42789
Pequeni-Chagres ridge		2530	"		head
Piedras-Pacora ridge		2460	"	"	42764

All have: dorsals 17; upper labials 8, 4th and 5th in eye; oculars 1–2 (subpreoculars present in 42787); temporals 1–2.

M.C.Z. No.	sex.	vent.	caud.
42787	♀	126	67
42788	♂	118	72
42789	♂	120	—
42764	♂	119	—

The outer edge of the ventrals and the lower 3½ (rarely 4½) scale rows are black. The dorsum is brown, slightly darker on the paravertebral rows, and slightly lighter just above the lateral band, especially anteriorly where this becomes a narrow white, black-bordered line reaching the eye. Belly red in life, with a few black flecks on the throat. Parietals, frontal, and supraoculars with more or less symmetrical black-edged yellow vermiculations; upper labials each with a black spot and black sutures.

Remarks. This snake, called "vibora candela" by the workmen, is close to *vermiculaticeps*, the type of the genus. The latter was described in 1860 from Cocuyas de Veraguas, a gold mine at some elevation above sea level on the Atlantic slope of Veragua. A recent year's record gives over 250 inches of rainfall with no dry season. *R. vermiculaticeps* (types ANS 3524–5, 3741) differs in having a narrow black lateral line on the lower edge of scale row 5; the vertebral row is light and the paravertebral rows dark; there is a black spot on the end of each ventral. It has thus four narrow black stripes; *sargenti* has two broad ones. The three male cotypes have 77, 78, 81 caudals; all three have 118 ventrals.

It is a pleasure to name this new form for Mr. Sargent, whose party took five of the six specimens.

Pliocercus euryzonus dimidiatus Cope

One from the Piedras-Pacora ridge. We think the separation of these ringed snakes from the striped Rhadinaeas justifiable. They are very long-tailed, but some striped Rhadinaeas are just as much so.

Urotheca, whose type, *dumerilii* from Cuba, has been very kindly examined for us by Mr. Roger Conant in Paris, is often used for this group. We do not think it congeneric. It may be a species of the later genus *Arrhyton*, or a Rhadinaea mislabeled as to locality, but we have been unable to identify it with any recognized species.

Pliocercus euryzonus euryzonus Cope

A female from Cana has 130 ventrals; 97 caudals; one preocular with a small subpreocular; 8 upper labials.

Coniophanes fissidens fissidens (Günther)

One from "Two Falls of Chagres, 400 feet"; one from "E party."

Erythrolamprus bizona Jan

A head from Cana. A revision of *Erythrolamprus*, in progress by the junior author, has brought to light the fact that the earliest available name for the common form of Costa Rica and Panama is *bizona*. As the original name was somewhat composite, it becomes necessary to restrict it to Colombian specimens with the bands double, *even on the neck*. It has well developed grooves on the teeth and a higher ventral count than other Central American forms.

Erythrolamprus mimus micrurus subspec. nov.

Type. MCZ 31828, adult female sent in by Dr. Clark in 1938.

Type locality. Mine at Santa Cruz de Cana in Darien, 2000 feet.

Range. Rio Concepcion, Atlantic slope Veraguas, Panama, to Andagoya and Rio San Juan, Chocó, Colombia.

Paratypes. MCZ 18848, 37887 France Field, Canal Zone; MCZ 24957 Juan Mina, Canal Zone; USNM 11136 Atlantic side isthmus of Darien; MCZ 32724–7 Andagoya, Chocó, Colombia; USNM 72353 San Juan River, Chocó, Colombia.

Diagnosis. An Erythrolamprus with grooves on the posterior maxillary teeth feebly developed or absent; a single black occipital collar; 9–15 (average 10.7) single black body rings 2–5 scales long, (often offset on middorsal line), edged with white.

Description. The type has 15 dorsals; 181 ventrals; 44 caudals; oculars 1–2; temporals 1–2; supralabials seven, 3rd and 4th in eye; infralabials nine on right side, five in contact with anterior geneials, ten on left side, 6 in contact with anterior geneials; anterior geneials

very much longer than posterior. Top of snout black to middle of parietals; rostral and upper labials mostly white; postoculars, posterior upper labials, hind half of parietals, temporals, mostly white; throat white; body red, with black, white-bordered rings, which are often offset on middorsal and midventral line and hence alternate; there is a neck band and 11 rings on each side on the body; three paired black rings with narrow white interspaces on tail; length 711 mm., tail 95 incomplete.

Variation. In eight paratypes the body rings vary from 9 to 12, but MCZ 37887 has 15. The red interspaces are about twice or more than twice the width of the dark rings which are broader in Panamanian than Colombian specimens. The snout is usually completely black in large specimens but the anterior sides of the head are spotted with light in smaller ones. Posteriorly there may be a light ventrolateral spot in the center of the dark rings. The black collar may or may not be complete ventrally. In MCZ 32724, from Colombia, the collar is represented by a median spot on the tips of the parietals, as in *mimus*, hence the subspecific designation. In eight paratypes the ventrals are 178–187, but USNM 11136 has 199. The caudals are 46–51 in six males; 42–46 in three females.

Remarks. E. mimus micrurus occurs with *bizona* in the following proportions:

	Chagres Ridges	Chagres valley	Panama Sabanas	Tuira valley	Cana
bizona	—	14	131	5	1
micrurus	2	6	—	1	3

We have three from Cana, one from Base Camp on Chagres, 350 feet; one from Piedras-Pacora ridge.

The present form, with *mimus* (*Liophis mimus* Cope) from eastern Peru and Ecuador, and *impar* Schmidt, from Nicaragua and Honduras, comprise a group characterized by the absence or feeble development of grooves on the posterior maxillary teeth, and by single body rings. The following key will serve to differentiate them from each other and from *bizona*.

A. Double black collar; double black body rings; grooves on maxillary fangs distinct; ventrals 181–201 (average of 74, 191.2); Costa Rica to Venezuela . . . . . *bizona*

AA. Single collar and body rings; grooves on maxillary fangs indistinct or absent; ventrals usually under 188.

B. Black collar covering posterior tips of parietals and at least 3 scales on midline of neck.

C. 12–15 body rings with light centers laterally; ventrals 171–183 (average of 11, 177); Honduras and Nicaragua ..... *impar*

CC. 9–12 (rarely more) body rings, usually solid, but occasionally split ventrally on the posterior part of the body; ventrals 178–199 (average of 9, 184.4); Panamá and Chocó ..... *micrurus*

BB. Black collar absent, represented by spots, or only about one scale wide on midline, diverging to about three scales on sides of neck; eastern Peru and Ecuador ..... *mimus*

E. mimus micrurus is practically identical in color with the recently described *Micrurus clarki* which occurs with it in the lower Chagres, in the lower Tuira, and at Cana. Its name was suggested by this similarity. They have been mistaken for each other on a number of occasions, even by experts.

Leimadophis taeniurus epinephalus (Cope)

Cana, USNM 50118–20. We have 12 from Cana. A female has dorsals 17–15, one scale pit; 140 ventrals; 60 caudals. A male taken swimming the Esperanza at 600 feet near mouth of Las Tres Hermanas Quebrada has 137 ventrals, 62 caudals.

Xenodon colubrinus Günther

Cana, USNM 50109. We have five from Cana. One has scales 19–17, oblique; 137 ventrals; anal single; oculars 1–2; temporals 1–2; upper labials 8, 4th and 5th in eye. One from Two Falls of Chagres, 400 feet.

Pseudoboa petola (Linné)

Cana, USNM 50111. We have a female from Cana (scales 19–17; 210 ventrals; 85 caudals); a female from Chagres divide two miles east of junction with Pequeni-Esperanza ridge, 700 feet (211 ventrals, 94 caudals); a male from Pequeni-Esperanza ridge, 1½ miles east of head of Adee, 1000 feet (198 ventrals, 95 caudals).

Pseudoboa clelia (Daudin)

"Casadora". Pirri Range, 5000 feet, USNM 50098. We have one from Cana. One from Pequeni-Esperanza ridge between head of Pequeni and Adee, 1150 feet.

Trypanurgos compressus (Daudin)

A male from Cana introduces the genus and species to the North American fauna. Dorsals 19–15, smooth with two apical pits; vertebrals and paravertebrals somewhat enlarged; ventrals 227+1; caudals 113; oculars 1–2; temporals 2–3; upper labials 8, 4th and 5th in eye; head white; throat and belly white; dorsum reddish brown with 23 narrow black crossbars; hemipenis to 8th caudal; sulcus and organ deeply bifurcate; spines increasing distally to beyond point of forking; calyculate area small, capitate; length 560 mm., tail 140. This compressed arboreal form is, as appears from the hemipenis, close to *Pseudoboa*.

Dendrophidion dendrophis (Schlegel)

"Monteadora". Cana, USNM 50123. We have nine from Cana; a female has 169 ventrals; nine upper labials, 4, 5, and 6, in eye. Nine from the ridges:

Pequeni-Esperanza ridge between Pequeni and Adee, 1200 feet.
" near head Pequeni, 2000 feet (♂, 151 ventrals).
" junction main divide, 1200 feet.
Playa Grande-Tres Hermanas ridge, 1800 feet (♂ 171 ventrals).
Chico-Limpio ridge 1½ miles from Chagres, 1600 feet.
Piedras-Pacora ridge, four.

Drymobius rhombifer (Günther)

Four from Cana. One from Pequeni-Esperanza ridge, 2 miles east of head of Adee, 700 feet. One from "E party."

Dryadophis boddaertii alternatus (Bocourt)

"Candelia". Twelve from Cana. A young male has dorsals 17–15; ventrals 183; caudals 94; upper labials 9, 4, 5, and 6 in eye; labials and throat black with white spots; anteriorly with a dorsal and a lateral row of alternating square black spots, posteriorly obscure. Two from junction of Pequeni-Esperanza ridge with main divide, 1000 feet; one from west branch of Cuango, 1100 feet.

Leptophis occidentalis (Günther)

One from Cana.

Leptophis depressirostris (Cope)

"Bejuco verde." One from Pequeni-Esperanza ridge near head of Adee, 1200 feet. No loreal; scales smooth except for strong keels on paravertebrals. This species, which ranges from Nicaragua to Colombia, has been previously taken in Panama at Cocuyas de Veraguas (the type); near Colon; and at Porto Bello (*Leptophis mexicanus* Schmidt, l. c., p. 16).

Oxybelis brevirostris (Cope)

"Bejuco verde." Sixteen specimens from the Chagres ridges.

In Miramar River, 200 feet (♀ ventrals 177 + 1, caudals 152).

Main divide near Pequeni-Esperanza ridge, 1200 feet (♂ ventrals 179, caudals 175).

Pequeni-Esperanza ridge near head of Pequeni, 1300 feet (three)
" " 1500 feet
" " 1930 feet
" near head of Adee 1200 feet

Chico-Limpio ridge 1540 feet

Few miles NE head of Limpio 2500 feet

Pequeni-Chagres divide between heads of Limpio and Tres Hermanas, 2380 feet

Tres Hermanas-Playa Grande divide, 1 mile from Esperanza, 1980 feet

Tres Hermanas-Playa Grande divide, 5 miles from Esperanza, 2050 feet

Piedras-Pacora ridge 2100 feet
" alt. ? (two)

In all the upper labials are six, 3rd and 4th in eye. In the entire specimens the scales are 15–13.

This species ranges from Nicaragua to Ecuador. The only previous Panamanian record was Cocuyas de Veraguas, from the type, USNM 31349.

Oxybelis aeneus (Wagler)

"Brown bejuco." One from Cana; Pequeni Esperanza ridge one mile from head of Adee, 1000 feet; Las Tres Hermanas-Playa Grande ridge five miles from the Esperanza, 1600 feet.

Rhinobothryum bovallii Andersson

Two from: head of Adee, two miles east of Pequeni-Esperanza ridge, 700 feet ("crawling beneath a cot after dark"; scales 21–17, weakly

keeled posteriorly; ventrals 246 + 2; caudals 107 +; female); "E party." The top of the head is black with white scale margins; temporal region red with black spots; neck white for two scales; a black band for 13 scales; a white ring for two scales; a red band with black spotting for ten scales; a black band, and so on for 15 black bands on body. Labials 8/10, fourth and fifth upper in eye; five in contact with anterior geneials; oculars 1–2; temporals 2–2; nostril very large; ventrals strongly keeled laterally.

This large and gaudy snake has so far been reported only from the type locality, Siquirres, Costa Rica. The senior author has seen it from Limon, Costa Rica; the Sabanas near Panama City; Yavisa, Darien; "Colombia."

Imantodes inornatus Boulenger

One from the Esperanza at 800 feet between the Tres Hermanas and the Playa Grande. The only previous specimen from Panama was from Progreso, Chiriqui (Univ. Michigan). It is also known from two Costa Rican and two Nicaraguan specimens.

Imantodes cenchoa (Linné)

"Mapana guinea." Four from Cana. A male has 17–17 scales; ventrals 216 + 2; 174 caudals; 8 upper labials, 3–4–5 in eye; oculars 1–2; temporals 1–2. Three have the more usual two labials in eye. Seven from the Chagres ridges.

Pequeni-Esperanza Ridge near head of Pequeni, 1800 feet
" " 2300 "
" at junction with main divide, 1200 feet
Tres Hermanas-Playa Grande ridge, ½ mile from Esperanza, 1200 feet
Near head of Piedras, 1600 feet.
Piedras-Pacora ridge.
"E party."

Drymarchon corais melanurus (Duméril and Bibron)

Two from Cana.

Pseustes poecilonotus shropshirei (Barbour and Amaral)

Two from Cana.

Spilotes pullatus pullatus (Linné)

Cana (USNM 50095, and 50096 from 3500 feet). We have two from Cana.

Chironius carinatus (Linné)

Cana (USNM 50097). We have 11 from Cana. A young specimen has 161 ventrals; 120 caudals; 9 upper labials, 5 and 6 in eye.

Chironius fuscus (Linné)

"Casadora." Cana, one head in poor condition, ten scale rows on neck. Six from the Chagres ridges:

Pequeni-Esperanza ridge near head of Pequeni, 1530 and 1800 feet.

Pequeni-Chagres ridge, 2500 feet.

Tres Hermanas-Playa Grande ridge, 1770 feet.

Dos Bocas of Esperanza and Chagres branch, on gravel bank near water, 600 feet.

Mouth of Piedras, 500 feet. Small and spotted, the rest big and black.

Five specimens of this species were previously known from Panama, the lower valleys of the Chagres, the Bayano, and the Tuira have each furnished a single specimen.

Lampropeltis triangulum micropholis Cope

A head and a section of body from a four foot specimen from 1700 feet on Pequeni-Esperanza ridge near head of Pequeni. The light areas are all red, instead of alternately red and white, thus differing from all other specimens of tropical *Lampropeltis*.

Leptodeira rhombifera Günther

Cerro Bruja (MCZ 24826, *L. annulata* Barbour and Amaral 1928; 21 scales, 172 ventrals; 70 caudals). Six from Cana.

Leptodeira annulata annulata (Linné)

Cerro Sapo, 1200–1500 feet, MCZ 17188. Cana, USNM 50115. We have six from Cana. Pequeni-Esperanza ridge near head of Pequeni, 800 feet (♀, sc. 21, ventrals 193); near mouth of Esperanza, 700 feet (♂, sc. 21, ventrals 188, caudals 101).

Tantilla armillata Cope

One from Cana.

Tantilla annulata Boettger

Cerro Bruja, MCZ 24927 (*Tantilla semicincta* Barbour and Amaral 1928). Cana, one specimen. The senior author has one from between Peralta and Turrialba, Costa Rica, kindly given him by Dr. Picado. We can thus add three to the two already known (the type in Lubeck from "Nicaragua" and a specimen in Hamburg without locality, described by Werner (1909:239).

	vent.	caud.	first lower labials in contact	nasal-ocular contact	body rings
Type	149	54	yes	yes	?
Hamburg	149	59 ♀	?	yes	14
Costa Rica	151	?	no	no	13
Cerro Bruja	149	?	no	no	12
Cana	153	65 ♀	yes	yes	11

Scales 15–15; oculars 1–2; temporals 1–1; upper labials 7, 3–4 in eye; head color that of *T. melanocephala* and related forms; body dull red, lighter below; narrow rings of black-yellow-black, frequently broken on middorsal line, absent on belly, more obscure posteriorly (especially so in the Costa Rican specimen and in the type). This is much the largest *Tantilla* (Hamburg specimen, 590 mm.) and closest to the ringed coloration of its more generalized ally, *Scolecophis*.

Tantilla schistosa (Bocourt)

A male from "E party" has scales 15–15; ventrals 132; caudals 34; mental in contact with geneials; nasal in contact with preocular; oculars 1–2; temporals 1–1; upper labials 7, 3–4 in eye; dark above; belly white anteriorly, red posteriorly; no head markings save a light collar. This specimen agrees well with the description of *schistosa* from Mexico and Alta Vera Paz, and with MCZ 15302 from Altos de Cangrejal, near San Jose, Costa Rica.

Stenorhina degenhardtii (Berthold)

Cana, USNM 50116. We have eleven from Cana; a female has 161 ventrals, 33 caudals, no loreal, prefrontal in contact with second upper labial. One from "E party." None have definite markings.

Micrurus mipartitus (Duméril and Bibron)

Cana, six. Cerro Bruja, MCZ 24925.

Micrurus clarki Schmidt

One from Cana.

Micrurus stewarti Barbour and Amaral

"Serrania de Bruja, 1200 m.", MCZ 24924, the type, remains unique. The altitude given seems excessive, as Cerro Bruja, the highest peak, is only 934 m.

Trimeresurus atrox (Linné)

Twenty-eight from Cana. Seven from the Chagres ridges, 700–2900 feet:

1 mile east of junction of Pequeni-Esperanza ridge and main divide, 1200 feet

2 " " " 700 feet

Tres Hermanas-Playa Grande ridge 4 miles from Esperanza, 1550 feet. Piedras-Pacora ridge, 2900 feet. "E party." No data (two).

trimeresurus montecelli (Peracca)

Cana, 3000 feet, USNM 50110, type of *Bothrops leptura* Amaral.

Trimeresurus nummifer (Rüppell)

A head from the Pequeni-Esperanza ridge near the head of the Pequeni, 1400 feet, is the first record for Panama.

Trimeresurus lansbergi (Schlegel)

One head from Cana.

Trimeresurus nasutus (Bocourt)

"Patoco." Cerro Bruja, USNM 54057. We have seventeen from the Chagres ridges, 600–2000 feet.

Pequeni-Esperanza ridge:
near head of Pequeni: 1000 feet (two); 1400 feet; 1500 feet; 1600 feet; 2000 feet.
near head of Adee, 1000 feet.
near river Adee, 1300 feet.
2 miles east of head of Adee, 700 feet.
1200 feet.
Main divide, 1 mile east of Pequeni-Esperanza ridge, 900 feet.
Chico-Limpio ridge, 3½ miles from Chagres, 1540 feet.
Spur ridge near Miramar, 600 feet; "B party"; no data.

Trimeresurus schlegelii (Berthold)

"Patoco." Eight from the Chagres ridges, 350–3000 feet.
Base Camp on Chagres, 350 feet; Two Falls of Chagres 400 feet (two); "Camp Patoco, E party"; "E party"; no data (two); Piedras-Pacora ridge 3000 feet.

Lachesis muta (Linné)

Seven from the Chagres ridges, 600–2100 feet.
Pequeni-Esperanza ridge near head of Pequeni, 1700 feet.
" 3 miles east of head of Adee, 600 feet.
" at junction with main divide, 1300 feet.
Pequeni-Chagres ridge, 1530 feet.
Playa Grande-Tres Hermanas ridge, 2100 feet.
Chagres-Piedras ridge, 2000 feet.
Rio Piedras.

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Mammals by BARBARA LAWRENCE
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No. 2. — *Collections from the Philippine Islands*

Introduction by Thomas Barbour
Mammals by Barbara Lawrence
Birds by James L. Peters

INTRODUCTION

By T. Barbour

I was surprised one day when one of my young friends on the staff of this Museum came to me and said, "I am going to the Philippine Islands." I said, "There is no place in the world from which we so much need material, but we have no funds to send you." It is difficult to express how deeply I was touched when she told me she had saved up enough to make the trip without asking for any support from the Museum. Principally interested in mammals, which she prepared beautifully, she made also an excellent collection of birds, the skins of equal excellence.

The material dealt with in this paper Miss Lawrence collected on various of the Philippine Islands during the early part of 1937 and includes, also, some bats previously sent to the Museum of Comparative Zoölogy by Mr. Pedro de Mesa. The following report is not intended to represent a systematic effort to cover thoroughly any definite areas, with a view to working out their interrelationships, nor is it intended to be a review of either the Philippine birds, or the Philippine mammals. It will be observed, however, that the list of birds collected contains a number of new records for several of the islands, descriptions of two new races and critical or taxonomic remarks that may have been called forth during the study of the collection. With regard to the mammals, Miss Lawrence proposes merely to supplement Hollister's really excellent work published in 1912 and 1913 and Taylor's more recent very comprehensive paper published in 1934. A few new species, however, were found and two new genera are described. What is almost more important, some of the species made known years ago have been rediscovered and there has been a considerable extension of some of the recorded ranges.

Miss Lawrence was principally interested in collecting bats, so that the localities visited were often chosen because of their reported bat population; other collecting was incidental and to a certain extent experimental. As would be expected, then, the most interesting results are found in the section on Chiroptera. The new forms described in this

paper include four species and one genus of bats; while a new generic name is proposed for the hog-badger. Good series were taken of various bats hitherto known from very scattered, or unreliable, records. It has, therefore, been possible to redescribe some of the earliest recognized forms, notably *Rhinolophus rufus* Eydoux and Gervais and *Rhinolophus philippinensis* Waterhouse. Also to a certain extent, this collection has made it possible to confirm some species and to establish limits of variation for others.

Localities where collecting was done are listed more or less in the order visited: on Luzon, at Baguio in the Mountain Provinces; at Lagangilang, Bucay, and San Juan, all near Bangued in Abra Province; at Baay, 50 km. east of Bangued, Abra Province; at Balbalasang, 35 km. west of Lubuagan, Kalinga Province; and at the Montalban Caves near Manila, in Rizal Province. On Mindoro mammal collecting was done in the vicinity of Calapan; at Gumalpong about 20 km. from the foot of Mount Halcon, on the northern side; at the Tabucala Caves on the lower slopes of the northern side of the mountain; on Marinduque, at Torrijos near the east coast; at the Simbahan Caves, near Santa Cruz; and in the vicinity of Boac; on Mindanao, in the vicinity of Zamboanga; at Curuan, 50 km. northeast of Zamboanga; and at Davao on the Cotabato coast; on Basilan, at the Basilan Lumber Company's camp, 15 km. northeasterly of Maluso, and at the Basilan Plantation Company near Isabela; on Mactan Island at Opon directly across the channel from Cebu; on Cebu, at the Minglanilla Caves 20 km. west of Cebu, at Bogo and at Kawit near Bogo. Material was also sent in from Palawan, from Bacuit on the northwest coast, from Brooke's Point on the southwest coast, and from Puerto Princesa. In addition, bird collecting was done by Francisco Rivera on Mindoro in the vicinity of Lake Naujan, Calapan, Pola, Baco, and Bignay on the eastern slopes of Mount Halcon.

Miss Lawrence takes this opportunity to extend her sincerest thanks to Mr. Arthur Fischer, and the members of the Bureau of Forestry, and to Dr. A. S. Arguelles, and the members of the Bureau of Science, for their assistance which contributed so much towards the great success of this trip. She thanks also Mr. Pedro de Mesa and Mr. Francisco Rivera for their untiring work on the Mindoro trips. To the many other friends whose hospitality made it possible for her to visit some of the more remote parts of the islands, she is naturally most grateful. In addition she thanks Mr. Gerrit Miller and the members of his staff for making available the material at the United States National Museum, and to Dr. Glover M. Allen at the Museum of

Comparative Zoölogy she particularly wishes to express much appreciation for his unfailing patience and kindness in helping her with many difficult problems.

As Director of the Museum which Miss Lawrence has served so faithfully, it falls to my good fortune to thank her in the name of the Museum Staff, not only for the fine results obtained, but for the spirit of self-sacrifice which often moved her to travel under conditions of the utmost discomfort in order that slender means might be spun out to make it possible to visit more localities and thus increase the value of the material which she secured.

After leaving the Philippine Islands, Miss Lawrence visited southern Sumatra and the Island of Nias and greatly enriched the Museum by what she gathered there.

Is it surprising then that I have presumed to write this introduction, knowing full well that Miss Lawrence, writing herself, would not have made clear the magnitude of her generous aid to enrich the institution of whose staff she is so conspicuous an ornament?

MAMMALS

By Barbara Lawrence

FAMILY TUPAIIDAE. TREE SHREWS[1]

Tupaia palawanensis Thomas

Tupaia ferruginea palawanensis Thomas, Ann. Mag. Nat. Hist., (6) **13**, 1894, p. 367 (Palawan, P. I.).

Three specimens, one of them young, were taken at Puerto Princesa, Palawan. The two adults, one male and one female, have the condylobasilar length 43.8 and 43.7 respectively which agrees with two specimens that Lyon records from Puerto Princesa in being considerably shorter than the type. In his review of the Tupaiidae (1913) Lyon considers the specimens from Palawan as all one species, *palawanensis*.

FAMILY SORICIDAE. SHREWS

Suncus luzoniensis (Peters)

Crocidura (*P.*) *luzoniensis* Peters, Monatsb. Königl. Preuss. Akad. Wiss. Berlin, for 1870, 1871, p. 595 (Philippines).

This is a common species in Luzon. Good accounts based on long series are given by Hollister (1913, p. 302) and by Taylor (1934, p. 80). My three specimens come from Lagangilang, Abra Province.

Crocidura grayi Dobson

Crocidura grayi Dobson, Ann. Mag. Nat. Hist., (6) **6**: 1890, p. 494 (Philippine Islands).

The exact type locality of this species is not known. Hollister reports specimens from Benguet, Mountain Provinces, Luzon. The single individual at hand was caught on the same island at Lagangilang, Abra Province. Externally it is almost indistinguishable from specimens of *Suncus luzoniensis* which were caught at the same place and appear to be commoner.

FAMILY PTEROPIDAE. FRUIT BATS

Cynopterus brachyotis luzoniensis (Peters)

Pachysoma luzoniense Peters, Monatsb. Königl. Preuss. Akad. Wiss. Berlin, for 1861, 1862, p. 708 (Yriga Volcano, South Camarines, Luzon, P. I.).

[1] Names of colors in quotation marks are after Robert Ridgway, "Color Standards and Color Nomenclature," published in Washington, 1912. External measurements, unless otherwise stated, were all taken by the author; length of hind foot always includes the claws.

Past attempts to determine the relationship between Bornean and Philippine bats of this genus have been unsatisfactory as not enough specimens have been available from either place. Now, thanks to the excellent series collected by J. A. Griswold, Jr., on Mt. Kinabalu, British North Borneo, it becomes possible to establish the limits of variation of the typical form and to show how *luzoniensis* falls outside of these.

Description. While the general pattern of color is much the same for all the small fruit bats of this genus, the actual shade and distribution of pigment are so variable within a given species as to make it extremely difficult to select a typical individual out of any series. *C. b. luzoniensis* can most readily be separated from typical *brachyotis* of Borneo by the much longer, softer fur with sharply contrasting bases to the hairs and by the olivaceous rather than brownish color of all the individuals, both male and female. This difference is very striking when series of both species are laid out together. In *luzoniensis* the hairs on the back below the bright ruff are deep "neutral gray" at the base with the tips dark "olive brown," almost "mummy brown," at the extreme tips and more olivaceous subterminally, while in *brachyotis* the bases of the hair are "hair brown" or "drab" imperceptibly grading into "Prout's brown" or, in the paler individuals, warm "ochraceous tawny" at the tips. The same contrasts hold true for females: in *luzoniensis* the gray bases are hardly noticeable and the tips are of a warmer shade than in the former race. The throat in males of both species varies from "burnt sienna" to a much brighter, more ochraceous tint, which may extend in a continuous wide stripe from back of the cheeks to below the mammary glands, almost forming a collar at the back of the neck, or it may be concentrated at the sides of the throat with only a slight patch around the mammary glands. The small contrasting patch on either side of the neck in females may vary from "antimony yellow" to "yellow ochre."

Both races are of about the same size, although on the average *luzoniensis* is slightly larger with a somewhat longer thumb. The difference is not enough to be of any value in identifying specimens.

Skull. The skull of *luzoniensis* is typically cynopterine as described by Andersen (1912, p. 587). It may be distinguished from that of *brachyotis* by its greater zygomatic breadth, and the greater width at the roots of the canines and across the lacrymal foramina; also the orbital ridges in the former are somewhat less inflated and the skull is slightly longer. The skull characters of these two forms are less dis-

tinctive than the color characters and there is a tendency, shown particularly in the females, to intergradation.

Peters (1867, p. 866), six years after he described *Pachysoma luzoniense*, put it into the synonymy of *brevicaudatus* (i.e. *brachyotis*). Gray (1870, p. 123), making no mention of Peters' form, describes two new races from the Philippines, *C. marginatus* var. *philippensis* and *C. marginatus* var. *Cumingii*. Matschie (1899, p. 76) returns to *luzoniense*, putting Gray's names into the synonymy, as does Hollister (Feb. 1912, p. 8). Andersen might have cleared this up when he wrote his review of the *Pteropidae* if there had been adequate material from the Philippines, but unfortunately he had only alcoholic specimens from which to draw his conclusions. Since the cranial differences alone are not sufficient to separate the two forms, it is quite understandable that he should have considered *luzoniensis* a synonym of *brachyotis*. Taylor follows him and, in addition, describes another species, *Cynopterus archipelagus* (1934, p. 182), from a single immature specimen caught on Polillo Island. The species is based on the slightly smaller size of the type, differently shaped nasal bones, more "squarish" molars, and lack of a central cusp on the last lower premolar and first lower molar. One other specimen, collected on the same island, he attributes to *brachyotis*. It is possible that a longer series might show that the differences are not as significant as he at first thought them to be.

As Taylor states (1934, p. 188), this little bat is apt to hang up during the day on the under side of palm leaves. Six of the nine specimens obtained I found hanging near the mid-ribs of green coconut fronds; one male and three females were together in one little cluster, two other females were hanging alone. The two from Basilan, one youngish, one adult, were the only bats to be caught in bird nets and the third was brought in by a native.

Distribution. On the evidence now at hand it is likely that all reports of *Cynopterus* from the Philippines should be attributed to *C. brachyotis luzoniensis*. These include records for Luzon, Mindanao, Palawan and Polillo. This additional series adds Mindoro and Basilan to the list.

Ptenochirus jagorii (Peters)

Pachysoma (*Ptenochirus*) *jagorii* Peters, Monatsb. Königl. Preuss. Akad. Wiss. Berlin, for 1861, 1862, p. 707 (Daraga, Albay Province, Luzon).

The two specimens at hand differ from Andersen's careful account of this species (1912, p. 645) in having the length of the upper cheek teeth

only 11.8 in an old male with the teeth very worn, and 12.2 in a female, and that of the lower cheek teeth 13.0 and 13.7 respectively. Andersen's measurements average about 1 mm. longer. The female appears young with the joints in the fingers not fully ankylosed and has a forearm measurement of only 77 mm. as against a minimum of 80 mm. given by Andersen (op. cit., p. 675). The male is of the same dark smoky brown as *Cynopterus brachyotis luzoniensis* with the tips of the hairs rather more "mummy brown" than "olive brown." The brown patch of short woolly hair on the rump mentioned by Taylor (1934, p. 179) contrasts strongly with the rest of the back. The bases of the hairs on the sides of the throat are dark "chestnut" with the tips paler and scarcely a trace of bright coloring around the mammary glands. The female is very gray both dorsally and ventrally, the back is "fuscous" and, presumably because it is young, lacks any olivaceous wash; the tinge of yellow on each side of the throat is very slight.

The single species of this genus is known from scattered records for Luzon, Mindanao, Mindoro and Tablas. The female examined was collected on Mt. Maquiling, Luzon, by Dr. R. E. Wheeler; the male comes from near Calapan, Mindoro. This latter was shot in the same coconut grove and hanging in similar fasion from the under side of a large frond as a specimen of *Cynopterus b. luzoniensis*. The two species when alive are most easily told apart by the thickened white ridge at the anterior margin of the ear and by the smaller size of the latter.

Haplonycteris gen. nov.

Type species. Haplonycteris fischeri spec. nov.

Diagnosis. This small fruit bat belongs to the cynopterine group as defined by Andersen (1912, p. xcv). Externally it may be distinguished by its small size, very long thumb, and the absence of a tail. In distribution of the fur it resembles quite closely the related genera *Aethalops* and *Sphaerias*, but the hind legs and membranes are less densely covered. As in *Aethalops*, the calcar is absent but the interfemoral membrane instead of being reduced to a mere ridge is fully 2.8 mm. wide. The lateral membrane, also, is wide in the region of the tibia and is attached to the outer margin of the first phalanx. The thumb is about two thirds as long as the third metacarpal.

In the absence of a postorbital foramen this genus agrees with *Aethalops, Balionycteris, Chironax, Thoopterus, Penthetor* and *Sphaerias* rather than with the more typical cynopterine bats, although the

square, blunt-nosed skull has very much the same shape and proportions as that of *Cynopterus*, from which it may further be distinguished by its greater interorbital breadth and short, heavy postorbital processes. The premaxillary bones above the teeth are high with a longer median suture than in any of the related genera, a condition that is most closely approximated by that found in *Penthetor*. The tooth formula of *Haplonycteris* differs from that of any of its allies in having only one pair of incisors and four molariform teeth in both upper and lower jaws: i. $\frac{1}{1}$ c. $\frac{1}{1}$ pm. $\frac{3}{3}$ m. $\frac{1}{1} = 24$. The single upper incisors are remarkably long and heavy and about half as high as the canines. They have the posterior side drawn out into a keel so that in cross-section they are almost triangular; viewed anteriorly the outer margins slope gradually away from the slightly rounded summits and the inner margins are in contact for almost their entire length. The intervening space between the canines and the incisors is scarcely as wide as the latter. The upper canines have no secondary cusp and there is only a trace of a heel. No distinct diastema sets the small Pm1/ apart from the canine and Pm3/. This latter is remarkable for its nearly equilateral triangular shape when seen from the side; further, the low inner cusp is placed much more nearly centrally than is usual in this group of bats and the ridge joining this with the outer cusp divides the tooth into nearly equal parts. The cusps of Pm4/ are lower and equidistant from the anterior and posterior borders of the tooth, with the transverse ridge passing directly across the middle. M1/ is small, tapering posteriorly and set at an angle so that the toothrows appear to converge at the back. In the lower jaw the incisors are in about the same proportion to the canines as in the upper, the wide trenchant crowns slope abruptly down and out. The canines almost meet posteriorly to the incisors and, as in the upper jaw, they have a very reduced heel and no trace of a supplementary cusp. Pm/1 is small and set closely between the canine and Pm/3. The latter has its crown drawn up into a very high cusp with the anterior margin sloping inward and backward, so that the actual point is almost in the center of the tooth when viewed from above. As in Pm4/, Pm/4 has the cusp placed more posteriorly than in other genera of this group, the transverse ridge crosses the tooth about one third of the way back from the anterior margin. M/1 is rectangular and low crowned. M/2 is entirely absent; it does not even appear to be deciduous as there is no thickening of the alveolar margin behind M/1 before the ramus slopes upward.

Haplonycteris belongs in the group of small cynopterine bats in which the postorbital foramen has become obliterated. In the reduction of the tooth formula with the strengthening of the remaining teeth, it appears to be the most highly evolved of this group. The unusually developed cusps and transverse ridges also indicate a greater degree of differentiation. Externally the distinguishing characters are less noticeable but the very long thumb has no parallel amongst the related genera.

This is the second genus of small fruit bat to be described from a single specimen taken in the highlands of Mindoro. The much larger genus *Harpyionycteris*, a very aberrant relative of *Dobsonia*, was described by Thomas (1896, p. 243) from a specimen collected by Whitehead, but no further specimens have been recorded since then.

Haplonycteris fischeri spec. nov.

Type. An adult male skin and skull, Museum of Comparative Zoology no. 35258, from Bignay, Mt. Halcon, Mindoro, P. I., collected by Francisco Rivera, 26 Apr. 1937.

Description. "Cinnamon brown" above as far as the region of the shoulders where the color gradually changes to pale "mummy brown" becoming darker anteriorly, particularly on the nose, cheeks, and crown of the head; bases of the hairs "drab." Entire under surface "wood brown" slightly washed with silvery down the center of the belly; neck glands "ochraceous tawny." Fur on the interfemoral membrane, forearm for one half its length, and lateral membrane as far as a line from the ankle to about the middle of the forearm, as well as a sparse scattering of fur on the feet, "cinnamon brown"; sprinkling of fur on the rest of the lateral membranes the same color. The wings are chiefly notable for the size of the thumb and its long claw which is a third again as long as those on the hind foot; the claw on the second finger is also well developed. The fourth metacarpal is conspicuously shorter than the third and fifth which are subequal.

Skull. The cranial characters are as described for the genus. In addition, the palate is short, not extending farther posteriorly than the level of the postorbital processes; the nasal bones are short and flattened at the base; the swellings at the orbital ridges and between them are pronounced. The dentition in both the upper and the lower jaws is remarkably heavy.

Measurements. The type measured as follows (the external measurements were taken on the dried skin by the author): *External:* hind foot,

10.8; forearm, 49.0; thumb, 23.1; third metacarpal, 35.0; fourth metacarpal, 31.2; fifth metacarpal, 33.4; *cranial:* total length, 25.0; basal length, 22.1; palatal length, 10.2; zygomatic width, 15.3; mastoid width, 11.3; interorbital width, 6.3; width outside molars, 8.2; combined length, upper cheek teeth, 8.6; combined length, lower cheek teeth, 8.6.

The only specimen obtained comes from the slopes of Mt. Halcon and was shot while it was flying at dusk. It has given me great pleasure to name this interesting new bat for Mr. Arthur Fischer, retired Director of the Bureau of Forestry in Manila, through whose kind and interested assistance I was able to obtain the help and coöperation of members of the Bureau in many of the outlying districts of the Philippines.

Rousettus amplexicaudatus (E. Geoffroy)

Pteropus amplexicaudatus E. Geoffroy, Ann. Mus. d'Hist. Nat., Paris, **15**, 1810, p. 96 (Timor).

These common little fruit bats are widespread not only in the Philippines but in some of the neighboring islands of the Dutch East Indies. My numerous records do not actually extend their known range, but fill in gaps where they were presumed to occur. Series were taken on Luzon from Bucay and Lagangilang in Abra Province; on Mindoro from Calapan on the East Coast and from Mamburao on the West Coast; on Lubang; on Cebu from Kawit near Bogo; and on Mindanao from the Dilirig Caves in the Misamis District and from Zamboanga. In spite of Taylor's findings to the contrary (1934, p. 176), practically all of my specimens as well as some that had previously been sent to the Museum of Comparative Zoology, were collected from large cave colonies. Of the three exceptions, one was brought in by natives and two were shot at dusk flying around a flowering acacia tree. The sixty-six individuals examined all fall within the same limits of variation without dividing into local races. Andersen (1912, p. 40) gives a good detailed description of this species.

Pteropus hypomelanus cagayanus Mearns

Pteropus cagayanus Mearns, Proc. U. S. Nat. Mus., **28**, 1905, p. 433 (Cagayan Sulu Island, P. I.).

Two examples of this race were taken on Marinduque near Boac. Both agree in having the mantle much more richly colored than the type and paratypes of *cagayanus,* the hairs of the mantle shade gradu-

ally from "mahogany red" at the extreme tips through "russet" to "warm buff" at the bases. With the exception of one individual from Panay which has the mantle "deep chrome," none of the series in the U. S. National Museum is as pale as the type series, although there is a considerable range of individual variation amongst these specimens. Hollister in his list of Philippine mammals (1912, p. 9) uses *cagayanus* only for those caught on Cagayan Sulu Island and refers those found on Dinagat, Guimaras, Leyte, Mindanao, and Panay to *P. h. hypomelanus*, the race that was first described from Ternate. Andersen (1912, p. 123) after comparing Mearns' paratypes with a topotype in the British Museum points out that the pale color of the mantle in the type series is probably due to bleaching, and calls all of the Philippine specimens *P. h. cagayanus*, restricting *h. hypomelanus* to those found in the Halmahera group. The absence of cranial characters separating the Cagayan examples from those found in the rest of the Philippines bears out Andersen's conclusions.

Pteropus vampyrus lanensis Mearns

Pteropus lanensis Mearns, Proc. U. S. Nat. Mus., **28**, 1905, p. 432 (Pantar, near Lake Lanao, Mindanao, P. I.).

Seven specimens were collected at Lagangilang, Abra Province, Luzon, and four from near Zamboanga, Mindanao. Of these, all but two from Luzon and one from Mindanao were melanistic. The others had the bright ochraceous mantle described by Andersen (1912, p. 360). A big colony of these bats was found in a tree in a large swamp near Zamboanga. I was there in April and at that season each evening they used to fly in great numbers over to Basilan to feed, a distance of about seventeen miles.

Pteropus tablasi Taylor

Pteropus tablasi Taylor, Monographs of the Bureau of Science, Manila, no. 30, 30 June 1934, p. 169 (near Odiongan, Tablas, P. I.).

The smallest of this series of three specimens from Mindoro Island has the forearm and hind foot slightly larger than the measurements taken by Taylor from the type, the only specimen obtained by him. Since the cranial measurements, particularly the lengths of the upper and lower cheek teeth, are very nearly the same as in Taylor's specimen, it is possible that his type is a young adult, in which case the average greater size of the three specimens at hand is to be expected.

The delicate skull, relatively large orbits which are greater in diameter than the lacrymal width of the skull, the moderately developed teeth, hairy tibia, and especially the strongly contrasting dark bases and pale tips of the bicolored fur, put this species into the *temmincki* group as defined by Andersen (1912, p. 315). The palest specimen has the tips of the hair on the back "cinnamon-buff," while the warmest one is almost "ochraceous orange"; the rather woolly mantle is not sharply defined, however, the lower back in all three specimens has the fur more silky and the less ochraceous tips of the hair are shorter. In all of them the contrast between the tips of the hair and the "clove brown" bases is very marked; the throat is almost as pale as the back and the rest of the under surface may be "clay color" or as dark as "russet" changing to "clove brown" at the extreme bases of the hairs.

Two other small species of *Pteropus* have been described from the Philippine Islands, both coming from the southern part of the group. *P. pumilus* Miller (1910, p. 394) is about the same size as *tablasi*, but has the bright mantle ending in a distinct line below the shoulders; the bicolored fur of the lower back never has the bases as dark as in *tablasi*, and is well sprinkled with entirely buffy hairs, giving it a peppered appearance instead of the uniformly pale-tipped aspect of the more northerly species. This latter has the forearm and tibia slightly more heavily furred. The skull in *pumilus* is distinctly narrower, especially when viewed posteriorly and the molar teeth are more slender. *P. balutus* Hollister (1913, p. 111) differs in similar but more extreme fashion from *tablasi*. In the former, the pale shade of the lower back is produced by a predominance of light buff in a mixture of pale and dark hairs, rather than by the pale, contrasting tips of a uniformly bicolored fur. The skull of *balutus* is larger and Pm4/ appears bigger and more nearly square in outline than in *tablasi*. The three specimens of *tablasi* show considerable variation both in external and in cranial measurements.

All three individuals were shot at night, two from near Gumalpong, inland from Calapan, Mindoro Island, where they were feeding on the partially ripened fruit of kapok trees; the third, from the outskirts of Calapan, was feeding in an alemendras tree.

Measurements. Measurements are given in the following order: male, M. C. Z. 35215, females, M. C. Z. 35216, 35217. *External:* total length, 180, 178, 160; hind foot, 35, 33, 31; ear, 26, 22, 23; forearm, 115, 111, 105; *cranial:* total length, 52.3, 51.8, 48.5; basal length, 47.1, 46.4, 43.7; palatal length, 24.5, 24.2, 23.1; zygomatic width, 29.6, broken, 22.3; mastoid width, 18.7, 17.6, 17.4; width outside molars,

14.4, 14.2, 13.8; length upper cheek teeth, 19.2, 19.2, 17.9; length lower cheek teeth, 21.6, 21.6, 19.9.

Distribution. So far this species is only known from four examples, the type from Tablas Island off the East Coast of Mindoro and these additional three specimens from near Calapan, Mindoro Island.

Acerodon jubatus jubatus (Eschscholtz)

Pteropus jubatus Eschscholtz, Zool. Atl., Berlin, pt. 4, 1831, p. 1 (Manila, Luzon, P. I.).

Five specimens of this common fruit bat were taken on Luzon at Lagangilang, in Abra Province, three were caught on Mindoro at Pasi and one near Calapan. There is considerable variation in the amount of buffy hair mixed with the dark on the lower back and the bright patch on the head may be restricted to the crown or may extend in a thin line backwards between the shoulders. One of the specimens was shot while feeding at night in a kapok tree, the others were brought in by natives.

Acerodon jubatus mindanensis Andersen

Acerodon jubatus mindanensis Andersen, Ann. Mag. Nat. Hist., (8) **3**, 1909, p. 26 (Mindanao, P. I.).

Andersen separates this race from the more northerly one solely on the basis of the slightly larger size of the type, the only specimen examined by him. Taylor lists fourteen more specimens taken on the Cotabato Coast of Mindanao, the forearm measurements of which average longer than those given by Andersen (1912, p. 430) for typical *jubatus*. Comparison of two individuals from Basilan with the series of *jubatus* from the more northerly islands shows a similar, though less pronounced, difference in forearm length; more noticeable is the much darker color of the Basilan animals. One of them has the bright patch on the crown reduced to the faintest sprinkling of buff-tipped hairs with no trace of "chestnut" at the sides of the throat. In the other the short "light buff" tips of the hairs on the crown fail to conceal the dark bases, and there is only the slightest tinge of "ochraceous buff" where the small bright patch merges with the short chestnut mantle. Clinging to the first specimen was a young male which also had only a very slight trace of buff on the crown.

A comparison of the long series of both *jubatus* and *mindanensis* in the U. S. National Museum shows great individual variation for each race with the bright phase more predominant in the former. On an

average the skulls of *mindanensis* are slightly larger than those of *jubatus*, although the proportions are the same.

The specimens of *mindanensis* were all shot from the same small colony in the forest northeast of Maluso on Basilan. Previously this race has been reported from the islands of Mindanao, Cabo, and Banga.

Eonycteris robusta Miller

Eonycteris robusta Miller, Proc. Biol. Soc. Washington, **26**, 22 March 1913, p. 73 (Montalban Caves, near Manila, Luzon, P. I.).

Gerrit Miller's description of this species constitutes the first record for the genus *Eonycteris* in the Philippine Islands. Although it is notably gregarious, he had only one specimen, which served as the type; subsequently both Edward Taylor and myself took topotypical series of this bat from the same cave. In addition I have a male and a female from San Juan, Abra Province, and a female from Baguio in the Mountain Provinces, both on Luzon; four males and three females from the Dilirig Caves, Misamis District on Mindanao; and two females from Lubang Island. From this material it appears that the species does not readily split into local races but is, on the contrary, a wide-ranging, variable form that probably is distributed over most of the islands. The existence of a second very distinct species of *Eonycteris* in the Philippines was first recognized by Taylor (1934, p. 127). Unfortunately he erroneously assumed that the name *robusta* applied to the form having an anal gland and a short tail. Examination of Miller's type shows that the reverse is the case, so *longicauda* Taylor goes into the synonymy of *robusta* and I am proposing a new name for the other form.

Eonycteris spelaea glandifera subspec. nov.

Type. An adult male skin and skull, Museum of Comparative Zoölogy no. 35159, from the Montalban Caves, Rizal Province, Luzon, P. I., collected 27 Feb. 1937, by Barbara Lawrence.

Description. On the basis of color alone this species is indistinguishable from *robusta*. The type, the brightest colored specimen I have examined, has the entire upper parts "chestnut-brown"; others in the series are more nearly "bister." The sparse, short fur on the under surface is "light drab" with a grayish wash on the tips of the hairs that is less pronounced posteriorly. To a certain extent the intensity of color on the throat in males varies with the age of the specimen; in the

type and in most of the examples seen it is "tawny olive." Two males from Marinduque differ in showing considerably more red pigment on the throat, the one being "tawny," the other "russet" mixed with "ochraceous-tawny." As a similar variation in throat color from orange to a reddish shade occurs in species belonging to related genera of small fruit bats, these two individuals are probably nothing more than variants which, when longer series are available, may be found to intergrade with the commoner form. Females all have the throat the same color as the belly. The short, irregular fur in this species is so sparse as scarcely to cover the lower back, belly, and top of the head, and barely a third of the forearm has a slight sprinkling of fine hairs. A topotypical specimen of *spelaea*, on the other hand, has longer, relatively more dense fur which completely covers the body and extends at least halfway up the forearm. *E. spelaea* may be further recognized by its very short tail.

Skull. The skull is chiefly remarkable for its large, broad teeth, particularly the two anterior upper molars, lower premolar four and molar one, the length of both tooth rows and the shape of the ramus of the lower jaw. *E. robusta*, the only other member of the genus found in the Philippines, differs from this species in having smaller, more slender molariform teeth that are not visible, as they are in *glandifera*, when the skull is viewed from above. Further, in the former the tooth rows are shorter and the braincase is more deflected. In *glandifera* the coronoid process of the lower jaw is more rounded and the angle of the jaw forms a rounder, more abruptly downward-projecting process. Compared with the more closely related *E. spelaea* of Burma, *glandifera* is somewhat larger with a more heavily built skull, less tapering rostrum and much greater width across the occipital crests and mastoid region. In both races the molariform teeth are of the same massive form, visible when the skull is seen from above; in the former they are actually smaller with the exception of the last molar which is variable. Skulls of *glandifera* from Luzon and Mindanao show all stages of intergradation within certain rather wide limits; those from Marinduque are definitely smaller with shorter rostra and tooth rows. Such a difference found in an island form might appear to be important were it not for the fact that two females caught in the same cave on Luzon diverge just as widely. This, together with the occurrence of typical *glandifera* in both the north and the south of the Philippine group, makes it more reasonable to regard the Marinduque specimens merely as extremes of a wide-ranging form rather than as a separate local race.

Measurements. Under the heading of *E. robusta,* Taylor (1934, p. 128) gives a series of measurements of specimens of *E. s. glandifera* caught in the same cave as some of the individuals at hand. In the following measurements, for comparative purposes, those of the type are given first, and those of a topotypical specimen of *E. spelaea* from Moulmein, Burma, next. *External: glandifera* only, total length, 141; tail, 16; hind foot, 19; ear, 21; forearm, 76; *cranial:* total length, 36.8, 36.1; total length to canine, 35.3, 34.7; basal length to canine, 31.2, 30.4; palatal length, 17.5, 17.6; zygomatic width, 21.7, 21.3; mastoid width, 15.5, 14.3; width across the occipital crests, 14.5, 13.0; width outside molars, 9.9, 9.0; length upper cheek teeth, 13.7, 12.4; length lower cheek teeth, 14.6, 14.1.

The two Philippine species of *Eonycteris* are most readily distinguished from each other by the presence in *E. s. glandifera* of paired anal glands in both male and female, a shorter tail, and much shorter lower leg, measured from the upper end of the tibia to the tip of the claws. In *glandifera,* also, the fur is shorter, particularly on the ventral surface, and the scrotal pouches are furred, whereas in *robusta* they show as naked, wrinkled areas of skin when the testes are withdrawn. *E. robusta* has the forearm slightly longer and the two terminal phalanges of the third finger are markedly so. *E. s. glandifera* is clearly the most closely related to the other described members of the genus; *robusta* is an aberrant form that differs from Andersen's summary of generic characters (1912, p. 729) in having no anal glands and in having the tail much longer than the hind foot with claws. In other respects this species falls well within the limits of variation of the genus as analyzed in the above-mentioned account.

In the Montalban Caves on Luzon and in the Dilirig Caves of Mindanao both species were taken together and Taylor (1934, p. 131) states that in the former at least they hang up separately. In the other caves where I collected them only one or the other of the species was taken.

A careful comparison with five specimens from Pematang Siantar and one from Lian si Peghe in Sumatra fails to show any consistent characters setting them apart from the Philippine *E. s. glandifera.* Andersen (1912, p. 735), on the basis of a short series of alcoholic specimens from Lian si Peghe, considered the Sumatran *Eonycteris* to be the same as that occurring in Burma. This further series shows that either the Sumatran and the Philippine individuals are actually the most closely related, or else have diverged from a mainland stock along such similar lines as to be indistinguishable from each other.

Macroglossus lagochilus lagochilus Matschie

Macroglossus lagochilus Matschie, Megachir. Berl. Mus. für Naturk., 1899, p. 96 (Buru).

Andersen (1912, p. 764) gives a good description of this species together with measurements and an account of the synonymy. Though a wide-ranging form, occurring through Borneo, Cagayan Sulu, Philippines, and the Amboina group, it appears to be solitary, and relatively few have been caught in the Philippines. My specimen was shaken out of a rolled-up hemp leaf on a plantation inland from Calapan on Mindoro; with five men at work only this single individual was caught during an entire day's search; another, presumably of the same species, escaped. This is the first record of *Macroglossus l. lagochilus* from Mindoro, although previously it has been reported from Panay, Tablas, Samar, Cuyo and Negros.

FAMILY EMBALLONURIDAE. SHEATH-TAILED BATS

Taphozous philippinensis Waterhouse

Taphozous philippinensis Waterhouse, Proc. Zool. Soc. London, **13**, 14 Jan. 1845, p. 9 (Philippine Islands).

I have followed Hollister (1913, p. 307) in considering *Taphozous philippinensis* distinct from the Indian *Taphozous melanopogon*, with which Dobson (1878, p. 380) considers the former to be synonymous. Two males from India both have the black beard well developed and surrounded by an area of very much elongated, slightly stiffened hairs, the tips of which are "cinnamon" rather than the grayer shade of the lower belly. A single male from Yunnan has a similar colored area of elongated hair on the throat but no trace of a black beard. Two males from the Philippines, on the other hand, show no marked specialization of the hairs of the throat. Further, the series of females from the Philippines shows the very pale under parts, almost white posteriorly, that Waterhouse particularly notes as characteristic of *philippinensis*. Males from the same place are darker bellied than the females. The single skull of *melanopogon* from Yunnan appears to be larger with a somewhat longer rostrum than the skulls of *philippinensis*. As the forearm measurements are also slightly longer in all the specimens of *melanopogon*, it is possible that additional material might show a significant size difference between the two species.

Six females from Calapan, Mindoro, constitute the first record for

that island. Two further specimens were taken on Luzon, in Abra Province, at Bucay. All were found in caves. In addition the museum has a long series of these bats taken at Cabra island, off Lubang, by Pedro de Mesa.

Saccolaimus pluto (Miller)

Taphozous pluto Miller, Proc. U. S. Nat. Mus., **38**, 19 Aug. 1910, p. 396 (Mercedes, Mindanao, P. I.).

Miller (1910, p. 396) described *T. pluto* from Mercedes near Zamboanga on Mindanao and listed two other specimens from Pandon, Albay, Luzon, as the same species. Hollister (1913, p. 308) makes a new species, *Taphonycteris capito*, of the two latter on the basis of their slightly smaller size, shorter pollex and metacarpals and larger, broader skull. In view of the range of variation shown by a series of five males from Mindoro Island, these differences appear less significant. In some instances the measurements of the types of *capito* and *pluto* actually fall within the extremes of the Mindoro series; other measurements taken from this series, in particular the length of the metacarpals, the interorbital and the mastoid widths are slightly nearer those for *capito*, while the length of the pollex, total length of the skull and length of the cheek teeth are somewhat closer to those for *pluto*. The fact that the Mindoro series occupies a somewhat intermediate position between the two described Philippine species of this genus and the wide range of variation in these five specimens from the same place make it seem probable that there is only one form, *pluto*, in the Philippines of which *capito* becomes, therefore, a synonym. The three specimens first mentioned above, constitute the previous Philippine records for this genus. These five additional specimens add Mindoro to the list. All are males and were found hanging up in a hollow coconut palm.

FAMILY MEGADERMIDAE. BIG-EARED BATS

Megaderma spasma spasma (Linnaeus)

Vespertilio spasma Linnaeus, Syst. Nat., Ed. 10, **1**, 1758, p. 32 (Ternate).

A series of twelve specimens from Abra Province in Luzon shows variations of from 35 to 40 mm. in the length of the ear and from 15.5 to 19.5 mm. in the length of the hind foot, although the length of the forearm only varies from 55 to 58 mm. Two specimens from Cebu both have the ears 41 mm. and the hind foot 19 and 19.5 mm. respectively. Cranial characteristics of the Cebu animals are quite the same

as those of the Luzon series. Five of the latter were caught in the same hollow tree. The others, as well as the two from Cebu, were found in caves. Previously this species has been recorded from Luzon and Mindanao.

FAMILY RHINOLOPHIDAE. LEAF-NOSED BATS

Rhinolophus virgo Andersen

Rhinolophus virgo Andersen, Proc. Zool. Soc. London, **2**, 1905, p. 88 (S. Camarines, Luzon, P. I.).

Compared with a specimen of typical *Rhinolophus borneensis* from Mt. Kinabalu, British North Borneo, the series of *R. virgo* agrees in most details with Andersen's excellent description, particularly in the smaller size, narrower horseshoe, and narrower nasal swellings. The ears, however, differ in that they are fully as large as those of *borneensis*. In color the single Philippine skin appears brighter than the Bornean one. In the former the extreme tips of the hairs on the back are "mummy brown," the bases of the hairs being "wood brown," and the belly is "ochraceous-tawny"; the Bornean skin is a uniform "chestnut-brown," slightly grayer on the under side. In addition to the type, Andersen had at hand another alcoholic specimen from the same locality; Taylor (1934, p. 217) reports two specimens, the one taken at Saub, Cotabato, Mindanao, the other at Bud Daho, eastern Jolo. The three specimens in the Museum of Comparative Zoölogy, one skin and skull from San Juan, near Bangued, Abra Province, Luzon, and two alcoholics collected by Pedro de Mesa on Lubang, serve to extend the known range in a north and westerly direction. Taylor's individuals were caught in dense jungle growth, mine in a small cave together with one specimen of *Hipposideros bicolor antricola*. The records seem to indicate that if not actually solitary this smallest Philippine rhinolophe does not roost in groups of more than two or three and possibly for this reason is not actually as rare as it appears in collections.

Rhinolophus philippinensis philippinensis Waterhouse

Rhinolophus philippinensis Waterhouse, Proc. Zool. Soc. London, **11**, 1843, p. 68 (Philippines).

Although this is one of the earliest known bats from the Philippines, the type specimen is the only identifiable example recorded. Study of

this additional series makes it possible to add some further interesting details.

Description. Hairs of the back "Hay's brown" to "light seal brown" very slightly tipped with "vinaceous buff"; the general appearance is of a soft-furred, dark brown bat with a faint silvery wash most pronounced anteriorly. Below, although the bases of the hairs are darker, the longer buffy tips make the ventral surface appear paler than the back. All three of my examples agree with the original description in having remarkably large ears, about two thirds as long as the head and body, with very big accessory lobes. The nose leaves, also, show an unusual development. The sella is high and broad with parallel margins and a slightly rounded summit; the base of the sella, together with the internasal lobes, forms the large cuplike expansion considered by Andersen (1905, p. 246) as characteristic of this section of the *philippinensis* group. The connecting process starts from well below the summit of the sella. The horseshoe is very wide, especially in the midline below the nares. The wings show the relatively unspecialized condition in which the fourth metacarpal is longest with the fifth slightly shorter, and the distal phalanx of the third finger is scarcely as long as, or shorter than, one and one-half times the length of the proximal (see measurements).

Skull. Andersen has given a very good description of the distinctive cranial characters of this group of bats. My specimens agree in having only a trace of a sagittal crest that slopes very gradually to a shallow postnasal depression. The nasal swellings are large, the four anterior ones forming the margin of the nasal aperture, instead of being separated from it by a thin brim of bone. The palatal bridge is about one half the length of the maxillary tooth row; measured along the median line it extends from the middle or front of Pm4/ to a point parallel with the posterior edge of M2/. The skull as a whole is light and slender, tapering gradually from the mastoid processes to the roots of the canines with no expansion of the roots of the zygomata. The canine and Pm4/ are widely separated so that Pm2/, placed well in the tooth row between them, is equally removed from each by a small but distinct space. The two small, bilobed upper incisors are separated from each other by a space about equal to their combined widths. In the lower jaw the minute Pm/3 is also in the tooth row and is either barely separated from Pm/2 and Pm/4 or is separated by a space as wide as the tooth itself.

Measurements. Measurements of three specimens are given in the following order: female, 35007; males, 35008, 35009. *External:* total

length, 86, 82, 87; tail, 33, 35.5, 30; hind foot, 10, 10.5, 10; ear, 34, 32.5, 35; forearm, 57, 56.5, 57; proximal end of tibia to tip of claws taken on dried specimen, 35.9, 36.0, 36.0; proximal phalanx 3rd finger, 17.3, 17.0, 17.6; distal phalanx 3rd finger, 23.2, 25.5, 23.8; nose leaf: breadth of the sella, 5.5, 6.0, 5.6; breadth of cuplike expansion, 9.3, 9.4, 9.3; length from base of cuplike expansion to top of sella, 12.8, 13.7, 13.5; breadth of horseshoe, 12.1, 12.0, 12.6; height of horseshoe, 11.3, 12.0, 11.1; *cranial:* total length to canine, 22.4, 23.0, 22.8; length to front of nasal swellings, 19.6, 20.4, 20.1; basal length, 18.5, 18.7, 18.8; palatal length, 3.9, broken, 4.0; zygomatic width, 9.9, broken, 9.5; mastoid width, 10.8, 11.0, 10.8; width outside molars, 7.3, broken, 7.0; length upper cheek teeth, 8.2, 8.7, 8.4; length lower cheek teeth, 8.7, 9.1, 8.7.

No comprehensive account of this species has been published since Waterhouse's original description in 1843 which deals almost entirely with the characters of the ears and nose leaves. There is no mention of the skull and, as the single specimen examined was in alcohol, the color notes are not very precise. Dobson (1878, p. 107) redescribes the type, adding little except a list of measurements which he took himself that are somewhat smaller than those of my specimens. Hoffman (1887, p. 24) attributes another individual collected on southern Mindanao to the same species, but he gives no description, so it is not possible to decide whether his identification is correct. Andersen (1905, pp. 243–247) gives an excellent account of the *philippinensis* group of *Rhinolophus.* He subdivides it into three sections, putting *philippinensis* and *achilles* from the Key Islands into the first and most primitive; with a few exceptions, the characters given are those for each subdivision as a whole, not for individual species. He does, however, include figures of a skull of *R. philippinensis;* no locality is mentioned, but as most of his material came from the British Museum, I presume it is that of the type. The average wing indices which he includes are for both *philippinensis* and *achilles* and differ considerably from an average taken for the six individuals of two subspecies that I have measured. In the following figures, the first are taken from Andersen (1905, p. 257), the second from my specimens: fa., 1,000, 1,000; 3rd metacarpal, 694, 749; 4th metacarpal, 716, 755; 5th metacarpal, 712, 753; 1st phalanx of 3rd finger, 290, 305; 2nd phalanx of 3rd finger, 386, 437, showing that in the latter the metacarpals, especially the third, are longer in proportion to the fa., and there is less difference in length between the 1st and 2nd phalanges of the 3rd finger. All three specimens were caught at Bucay in Abra Province on Luzon.

The type of *R. philippinensis* was collected by Hugh Cuming during the course of three years' collecting in the Philippines. Although he visited most of the large islands, he spent the greater part of his time on Luzon so it seems probable that the type came from there. I therefore designate Luzon as the type locality and consider specimens from Bucay, Abra Province, to be typical.

Rhinolophus philippinensis alleni subspec. nov.

Type. An adult female, skin and skull, Museum of Comparative Zoölogy no. 35097 from the lower slopes of Mt. Halcon, northern side, near Calapan, Mindoro, P. I., collected 7 March, 1937, by Barbara Lawrence.

Description. Compared with three specimens from Bucay, Abra Province, Luzon, representing the typical race, this form may be distinguished by its slightly smaller size, smaller ears, and differently shaped nose leaves. While the forearm is almost as long as that of *R. philippinensis,* the lower leg measured from the proximal end of the tibia to the ends of the claws is much shorter. The ears are shorter, both actually and in proportion to the total length, and their maximum width is less. The nose leaves are smaller, the sella and the cup-shaped expansion are narrower; the edges of the horseshoe instead of curving out and up with a smooth even border are somewhat crenellate with two pronounced notches on either side of the small triangular projection halfway up the margin. The lower lobes that extend downward covering the upper lip are narrower than in the preceding form. There is no difference in color between these two races. The relative lengths of the wing bones are the same in both except that in *alleni* the terminal phalanx of the third finger is as long as, or slightly longer than, one and one-half times the proximal.

Skull. The skull of *R. p. alleni* is similar to that of *R. p. philippinensis:* slender, with weak zygomatic arches; occipital crest reduced to a thin line; large nasal swellings that actually form the upper and lateral margins of the nasal aperture without any intervening bony plate; small teeth with a wide space between the canine and Pm4/; Pm2/ well developed, triangular in cross-section, the cingulum around the single cusp very noticeable; Pm/3 in the tooth row, a trifle more crowded in the former than in the latter, though this is a variable character. Skulls of *R. p. alleni* may be readily distinguished from those of the typical form by their smaller size; the difference is more one of length than of width. The nasal swellings of the former are narrower as well as much shorter antero-posteriorly, and the back

ones that form the anterior border of the temporal fossa are less inflated. As would be expected in a smaller skull, the tooth rows in both upper and lower jaws are shorter with a corresponding decrease in individual tooth size. The palatal bridge in *alleni* is relatively shorter, extending from a point opposite the middle or the posterior edge of Pm4/ to one back of M2/.

Measurements. Measurements of the three specimens, all females, are given in the following order: the type, no. 35097, then 35098 and 35099. *External:* total length, 82, 85, 83; tail, 31, 30, 29; hind foot, 12, 12, 11; ear, 32, 30, 28; forearm, 55, 56, 55; proximal end of tibia to tip of claws taken on dried specimen, 33.5, 32.3, 33.1; proximal phalanxof third finger, 16.4, 16.6, 16.2; distal phalanxof the third finger, 23.4, 23.9, 24.2; nose leaf: breadth of the sella, 4.9, 5.0, 4.4; breadth of cuplike expansion, 7.6, 7.3, 7.8; length from lower margin of cuplike expansion to top of sella, 11.7, 11.8, 11.4; breadth of horseshoe, 11.3, 11.0, 11.5; height of horseshoe, 10.5, 10.3, 10.3; *cranial:* total length to canine, 21.3, 21.9, 21.5; length to front of nasal swellings, 18.5, 18.9, broken; basal length, 17.5, 18.0, 17.7; zygomatic width, 9.4, 9.6, 9.4; mastoid width, 10.1, 10.5, 10.3; width outside molars, 6.9, 6.9, 6.8; length upper cheek teeth, 7.7, 8.0, 7.9; length lower cheek teeth, 8.0, 8.4, 8.5.

Three females of this subspecies were collected in two caves close together on the lower slopes of Mt. Halcon. It is evidently not very common as these were the only ones in a long series of other bats from the same caves. Both races of *Rhinolophus philippinensis* may readily be distinguished from other members of the genus found in the Philippines by their enormous ears and their extraordinarily developed nose leaves. The race is named for Dr. G. M. Allen to whom I am most grateful for much help in the preparation of this paper.

Rhinolophus rufus Eydoux and Gervais

Rhinolophus luctus varietas *rufa* Eydoux and Gervais, Zool. Voy. 'Favorite,' 1836, p. 9 (Manila, Luzon, P. I.).

This series undoubtedly belongs to the form to which Eydoux and Gervais had reference, although later writers in lack of further specimens have since put the name into synonymy.

Description. In general appearance this bat looks like an over-sized somewhat darker example of *Rhinolophus subrufus.* It has two, not very well marked, color phases that to a certain extent may be said to intergrade. In the one the hair is "Vandyke brown" at the tips shading gradually into "avellaneous" at the bases; the soft wavy fur if

ruffled has a silvery tinge when seen in certain lights. The other extreme is a much warmer-colored animal with the tips of the hair "auburn," their bases "ochraceous tawny." The effect is of an ochraceous-tawny bat washed with dark. In both cases the ventral surface is of about the same color as the dorsal, the sparse fur on the throat being a trifle paler. In the brighter-colored individuals, the fur on the throat and below the wings is slightly grayer than on the back. This very large species has nose leaves which in all their details resemble very closely the smaller ones of typical *R. arcuatus*. The horseshoe extends to almost cover the upper lip, the sella is parallel-margined, rounded at the apex, and scarcely expanded at the base; the connecting process, "strongly arcuate," and starting from the very tip of the sella is thinly haired but without a pronounced tuft of hairs at the base as is the case in *R. subrufus*. The ears are moderately large, pointed at the tip, and just below on the outer edge sharply emarginate. Andersen in his paper on *Rhinolophus* (1905, p. 283) emphasizes the importance of the relative lengths of the wing bones. Following his method, I have used a constant figure, 1,000, for length of forearm in all individuals and have set the other measurements in proportion to this. The differences that appear, although so slight as to be of little diagnostic value for ordinary taxonomic work, are interesting in that they show an unusual line of development, particularly in the elongation of the metacarpals and in the proportions of the terminal phalanges of the third digit. Relatively, metacarpals five and three are the most elongated, although three is still shorter than four, with the result that the difference in length between four and five is the same as that between three and four except for a few cases where the two latter approximate each other slightly more closely. This is in direct contrast to the condition that obtains in the rest of the group where four and five are subequal or five very slightly shorter, and three is markedly shorter than four. This development of the metacarpals is associated with a lengthening of the proximal phalanges; in the third finger III^1 is longer in proportion to III^2 than in the rest of the *arcuatus* group. In the latter III^2 is well over one and one half times the length of III^1 while in *rufus* the average is only just one and one half. To a lesser degree IV^1 and V^1 are also elongated. If Andersen is correct in stating that the lengthening of the fifth metacarpal and of III^2 indicates a more advanced stage of development (op. cit., p. 283), then we have here a curious intermediate state in which metacarpal five is rather highly specialized and the phalanges of the third finger retain their more primitive condition.

Skull. The skull is very much larger than in any other species of the *arcuatus* group, but is quite similar in proportion. The sagittal crest is keel-shaped and high; anteriorly it divides to form two very pronounced supra-orbital ridges with a deep nasal pit between them. The two median nasal swellings are large and strongly projecting; the lateral ones are not as highly developed as in the *philippinensis* group. The width across the roots of the heavy zygomatic arches is considerably greater than the mastoid width. The palate is short, as is typical for the group, extending from the posterior margin of Pm4/ to the middle of M2/ when measured in the mid-line and is equal in length to between a quarter and a third of the maxillary tooth row. The molariform teeth are rather large and heavy, Pm2/ is small and closely wedged between the canine and Pm4/. Pm/3 is minute and peglike, scarcely as high as the cingulum of Pm/2. Pm/2 and Pm/4 are either separated by a slight space or are barely in contact instead of strongly pressed together as is common in other members of this group. The very large size of *rufus* readily separates it from other members of the *arcuatus* group; from *luctus,* the nearest large member of the closely related *philippinensis* group, it may be separated by its shorter palate, larger teeth, slightly lower sagittal crest sloping more gradually anteriorly, its less developed nasal swellings, and by its general lighter, more slender appearance.

Measurements. The measurements of three males are given in the following order: M. C. Z. 35092, 35089, 35086; for the five females I have given the two extremes and an average. *External:* total length, male, 111, 114, 119, female, 101–110, 106; tail, male, 29, 30, broken, female 24–33, 28; hind foot, male, 17, 17, 16.5, female, all 17 except one 16.5; ear, male, 31, 34, 32, female, 29–32, 30; forearm, male, 71, 70, 71, female, 67–70, 69; *cranial:* total length, male, broken, 32.3, 33.2, female, 30.7–31.4, 31.1; total length to canine, male, broken, 31.0, 31.7, female, 29.5–30.2, 29.9; basal length, male, broken, 26.2, 26.5, female, 24.4–25.0, 24.7; palatal length, male, 4.0, 3.5, 4.2, female, 3.7–4.0, 3.9; zygomatic width, male, broken, 14.6, 14.7, female, 13.9–14.4, 14.1; mastoid width, male, 13.1, 13.3, 13.7, female, 12.6–13.2, 13.0; width outside molars, male, 11.3, 11.6, 11.5, female, 11.1–11.4, 11.2; length upper cheek teeth, male, 13.1, 13.1, 13.0, female, 12.4–12.5, 12.5; length lower cheek teeth, male, 14.1, 14.2, 14.0, female, 13.4–13.5, 13.4.

Eydoux and Gervais on their voyage around the world in the "Favorite" collected a large leaf-nosed bat in the Philippines which they subsequently described as a variety of *Rhinolophus luctus* Tem-

minck, "Le couleur ordinaire du Rhinolophe Deuil" (*Rhinolophus luctus*) "est d'un brun noir, — mais dans la variété que nous décrivons quoique la feuille soit parfaitement la même le pelage est généralement roussâtre." As no specimens have been recorded since 1836, later writers have generally put it into the synonymy of *luctus*, a large Bornean rhinolophe that has never been reported from the Philippines. Hollister, however (1912, p. 14), felt that the name should be retained until further collections were made, and Andersen, being unable to examine the type, hazarded the guess that the specimen was one of the species later described as *philippinensis*. The rather large series of both species at hand shows *rufus* to be a totally different type of bat. As well as being much larger it has relatively smaller, differently shaped ears and nose leaves. Further, it agrees with the original description in being very like the specimen of *Rhinolophus luctus* figured by Temminck (1841, pl. 30); the size, the pointed, moderately large ears, and the proportions of the nose leaves, except that there are no lateral expansions at the base of the sella, are almost identical. A comparison of this series of *rufus* with three specimens of *luctus* from Mt. Kinabalu, Borneo, shows such a degree of superficial resemblance as to make Eydoux and Gervais' emphasis on their relationship quite understandable. On a more detailed examination, the greater development of the central portion of the nose leaves in *luctus*, the proportions of the metacarpals, as well as those of the phalanges of the third digit, and certain cranial details distinguish these two species so clearly as to put them in separate groups. It is interesting to reestablish beyond any doubt the existence of this species, and to find that it belongs to the *arcuatus* section of *Rhinolophus* of which it is by far the largest member, rather than to the *philippinensis* group as was originally supposed.

Distribution. The type comes from Manila; my specimens were caught on Mindoro and Marinduque Islands as indicated above. In neither of the two caves where they were found did they seem particularly rare, possibly because both were remote and seldom visited by the natives. With a greater development of the surrounding country these bats might be driven away; this would explain their never having been retaken on Luzon.

Rhinolophus arcuatus arcuatus Peters

Rhinolophus arcuatus Peters, Monatsb. Königl. Preuss. Akad. Wiss. Berlin, for 1871, 1872, p. 305 (Luzon).

This species was so plentiful in the caves where it occurred that I think it curious to have found it only on Mindoro. On that island specimens were caught in two separate caves near Calapan and in the Tabucala Caves on the lower slopes of Mt. Halcon. Hollister (1913, p. 309) reports fifty-seven individuals from various localities in Luzon and one from Mt. Halcon, "Mindanao" (a misprint for Mindoro). Those examined agree in detail with Andersen's description of the species (1905, pp. 281–283), except that he describes the sella as being "ovate" or "ovate-pyriform" whereas I find it to be parallel-margined with an obovate tip. Further, he states (op. cit., p. 287) that in the members of the *arcuatus* group Pm/3 is either situated external to the tooth row or entirely lost. The former obtains for all of my specimens except one where Pm/3 is definitely in the tooth row. Another species of the same size, *R. anderseni* Cabrera, has been described from the Philippines, probably Luzon. Both the external and cranial measurements fall within the limits of variation of *arcuatus* with the exception of those of the last three metacarpals which are shorter in *anderseni* than in the specimens of *arcuatus* that I have measured. As similar measurements taken by Peters in the *arcuatus* group are also slightly less than mine, I do not feel that this constitutes a very good differential character between the species, nor does the slightly lower point of origin for the connecting process of the sella in *anderseni* seem sufficient to separate them. Without examining Cabrera's type it is impossible to say in what relation these forms stand to each other, so until a further comparison of the two it seems best to attribute my entire series to the older described form, *arcuatus*.

Rhinolophus arcuatus exiguus Andersen

Rhinolophus arcuatus exiguus Andersen, Ann. Mag. Nat. Hist., (7), **16**, 1905, p. 283 (Zamboanga, Mindanao).

This race is described as differing from typical *arcuatus* only in the narrower horseshoe and nasal swellings. A series of six specimens from Dilirig Caves, Misamis District, Mindanao, collected by L. H. Phillips, agrees perfectly with Andersen's account.

Rhinolophus subrufus subrufus Andersen

Rhinolophus subrufus Andersen, Ann. Mag. Nat. Hist., (7), **16**, 1905, p. 283 (Manila, P. I.).

A series of eight specimens, five from Bucay, Abra Province, three from the Tabucala Caves on Mt. Halcon, Mindoro, shows a slight

amount of color variation, although none of them reaches the "cinnamon-rufous" extreme noted by Andersen (op. cit., 284); in the series at hand, the brightest individuals have the hair "pinkish cinnamon" minutely tipped with "cinnamon-brown." In other respects they agree closely with the original description. This is the first time the species has been reported from Mindoro. Previous records include Luzon and Mindanao, although from the latter place they may possibly be referable to the more recently described *Rhinolophus subrufus bunkeri* Taylor.

Rhinolophus subrufus bunkeri Taylor

Rhinolophus bunkeri Taylor, Monographs of the Bureau of Science, no. 30, Manila, 1934, p. 228 (Saub, Cotabato, Mindanao, P. I.).

Three specimens from Davao probably belong to this race although in various points they differ from Taylor's description, possibly because his account was taken from one specimen only.

Description. Forearm measurements of the series from Davao instead of being shorter are slightly longer than in the typical form (*bunkeri*, 59.0–59.5, *subrufus*, 54–59, average 56), in the former, also, the lappets of the horseshoe are definitely narrower, and the distribution of fur on the foot is the same in both races. In other respects this series conforms closely to the original description of *bunkeri*, and agrees in having the skull slightly more massive than *subrufus* with a greater zygomatic width, although the mastoid width is not noticeably different. The molariform teeth are larger than in *subrufus* while Pm3/ is smaller as viewed from above. The sagittal crest is strong but the supraorbital ridges are obsolescent and there is only a trace of a depression posterior to the nasal swellings, whereas in typical *subrufus* the sagittal crest divides into two pronounced supraorbital ridges that enclose a well-marked nasal pit. In color this race approaches closely the dark phase of *R. rufus;* all three specimens are "Natal brown" with the fur only scarcely paler at the roots and having a very pronounced silvery sheen when viewed in certain lights.

Measurements. Measurements of three females are given in the following order: M. C. Z. 35279, 35280, 35281. *External:* total length, 89, 96, 92; tail, 27, 28, 32; hind foot, 16, 16, 16; ear, 24, 25, 26; forearm, 59, 59, 59.5; *cranial:* total length, 26.0, 25.6, 26.9; total length to canine, 24.8, 25.4, 25.3; basal length, 20.5, 21.0, 20.8; palatal length, 2.9, 3.0, 3.2; zygomatic width, 12.6, 13.3, 13.0; mastoid width, 11.4, 11.7, 11.7; width outside molars, 10.0, 10.0, 10.4; length upper cheek teeth, 10.1, 10.0, 10.5; length lower cheek teeth, 11.1, 11.0, 11.4.

The difference in color, large foot, large molariform teeth, and absence of a post-nasal depression readily distinguish this form from the closely related *R. subrufus*. However, the size, the general shape of the skull, and the proportions of the wing bones are too similar to warrant its recognition as a full species. A much more accurate idea of its relationship to the other Philippine rhinolophes is obtained by considering it a race of *subrufus*. At present it is recorded from the Cotabato Coast, Mindanao, only; my three specimens come from near Davao, and Taylor's from Saub.

FAMILY HIPPOSIDERIDAE. HORSESHOE BATS

Hipposideros diadema griseus (Meyen)

Rhinolophus griseus F. J. F. Meyen, Nov. Acta Acad. Caes. Leop.-Carol., **16**: pt. 2, 1833, p. 608 (San Matheo Cave, Luzon, P. I.).

The Philippine bats of the *Hipposideros diadema* group are so variable as to make their identification very difficult. Andersen (1905, p. 497) calls his series of eight adult and five young specimens from Luzon, Catanduanes, Leyte, and Mindanao all *H. d. griseus*, although he remarks that one exceptionally small individual may be a distinct species. If this were the case, we would have the same situation that occurs in the genus *Rhinolophus*, where species distinguishable principally on the basis of size occur in the same territory. Taylor (1934, p. 246), with six specimens from various localities in Luzon and twenty from Mindanao, apparently decides that the least of his series, an individual from Rizal Province, Luzon, is enough smaller than the others to be worth describing. Except for a slightly narrower horseshoe, the difference is entirely one of size. Careful examination of a series of six specimens from Cebu, seven from Mindoro, one from Luzon, and one from Mindanao, shows that there is no sharp differentiation between the larger and the smaller ones. One female from Mindoro is as small as the type of *H. d. andersoni*, with the skull and tooth rows even shorter; a male from the same place is only slightly larger and there is a progressive increase in size from these to the largest which are as large as the biggest of Andersen's series. When the series from Cebu and Mindoro are compared, it becomes apparent that those from Cebu average slightly larger; however, the species is too variable and the measurements of both series overlap too much to make any subdivision reasonable. It is altogether possible that colonies on different islands may tend to vary in size but the dif-

ferences are not well enough marked to do more than confuse the distributional picture, if an attempt is made to recognize them with distinct names. It is interesting to note that the tendency of *H. diadema* in the Philippines is not to divide into larger and smaller races, with similar ranges as both Andersen and Taylor supposed, but to split up locally into subspecies separated by some natural barrier.

Measurements. Measurements of Mindoro specimens are given as follows: extremes and average for four males, the same for three females. *External:* Total length, male, 127–135, 132, female, 125–136, 130; tail, male, 43–46, 45, female, 36–46, 41; hind foot, male, all 17, female, all 17; ear, male, 25–27, 26, female, 23–26, 25; forearm, male, 79–83, 81, female, 76–80, 78; *cranial:* total length, male, 30.2–31.0, 30.7, female, br., 28.7, 29.3; total length to canine, male, 29.6–30.8, 30.1, female, 28.6–29.0, 28.8; basal length to canine, male, 23.9–24.7, 24.3, female, 23.1–23.5, 23.3; palatal length, male, 4.4–5.0, 4.7, female, 4.0–4.5, 4.3; zygomatic width, 16.0–16.4, 16.2, female, 15.9–16.4, 16.2; mastoid width, 13.8–14.2, 14.1, female, br., 13.7, 14.0; width outside molars, male, 10.8–11.4, 11.1, female, 10.9–11.4, 11.1; length upper cheek teeth, male, 11.8–12.1, 11.9, female, 11.4–11.5, 11.5; length lower cheek teeth, male, 13.1–13.5, 13.3, female, 12.7–12.8, 12.8.

Measurements of Cebu specimens are given as follows: two males, extremes and average for four females. *External:* total length, male, 140, 146, female, 139–143, 141; tail, male, 48, 53, female, 47–56, 51; hind foot, male, 17, 18, female, 17–18, 18; ear, male, 24, 27, female, all 28; forearm, male, 88, 85, female, 83–86, 84; *cranial:* total length, male, 31.5, 31.2, female, 30.9–31.4, 31.1; total length to canine, male, 31.3, 31.0, female, 30.2–30.7, 30.5; basal length, male, 25.0, 24.8, female, 24.1–24.8, 24.5; palatal length, male, 4.8, 5.1, female, 4.7–5.2, 5.0; zygomatic width, male, 17.7, 16.5, female, 17.0–17.5, 17.2; mastoid width, male, 14.5, 14.3, female, 14.1–14.5, 14.3; width outside molars, male, 12.2, 11.3, female, 11.2–11.9, 11.5; length upper cheek teeth, male, 12.6, 12.2, female, 11.9–12.2, 12.0; length lower cheek teeth, male, 14.3, 13.6, female, 13.1–13.6, 13.4.

Hipposideros bicolor antricola (Peters)

Phyllorhina antricola Peters, Monatsb. Königl. Preuss. Akad. Wiss. Berlin, for 1861, 1862, p. 709 (Paracali, Luzon, P. I.).

Study of our long series of *Hipposideros* shows conclusively that the form of *bicolor* found in the Philippines is a valid race and easily distinguished from the typical one described by Temminck.

Description. Tips of the hairs on the back for a quarter to a third of their length range from "vandyke brown" to "auburn" while the bases are pure white. On the ventral surface the tips of the hairs are "snuff brown" to "wood brown," darkest along the sides of the belly; the bases are only slightly paler. One example of typical *bicolor* from Java when compared with this series has the tips of the hairs as pale as the palest of the Philippine ones and the bases are white for at least three-quarters of their length; the hair on the ventral surface is sharply bicolored, the "avellaneous" tips contrasting strongly with the pale "tilleul buff" bases. In *antricola* the shape of the nose leaf is also very distinctive: the upper end of the septum is expanded and bulbous and the margins of the horseshoe extend inward so as to conceal the nostrils.

Skull. In size, shape, and general proportions, skulls of *antricola* are very close to those of typical *bicolor.* In the former, however, Pm2/ is smaller and is either closely wedged in between the canine and Pm4/ or forced out to the side of the tooth row so that these two teeth are almost in contact. A further difference lies in the much greater development of the heel of Pm4/ in *bicolor* as compared to the condition that obtains in *antricola;* in the former this is equal in bulk to about half the protocone and projects backward and inward in a strong semicircular curve, whereas in *antricola* it is reduced to a narrow ledge widening slightly behind the protocone.

Peters' brief description of this race, although it contains no notes on the skull and little of significance on the color, includes a list of measurements which, from the shortness of the ear ("17" mm.) and the tibia ("16.5" mm.) enable us to identify his race as the local form of *H. bicolor.* Dobson (1878, p. 151), after examining a single specimen from Luzon, puts *antricola* into the synonymy of *bicolor.* Matschie (1898, p. 39) with a series of six specimens available from Manila uses the name *antricola,* and Hollister (1912, p. 15) on the strength of records from Peters and Elera for *bicolor* and Matschie for *antricola* records both as species from the Philippines although subsequently (1913, p. 309) he identifies the two specimens in the U. S. National Museum as the latter. Actually, one at least of these specimens, U. S. National Museum 101969 from Luzon, belongs without question to the long-eared species described below and is very distinct from the shorter-eared type of bat to which the name *b. antricola* must be applied. Taylor (1934, p. 237) recognizes the existence of a distinct race of *bicolor* in the Philippines but, assuming that *antricola* should go to the long-eared group, redescribes it as *H. bicolor wrighti.* Taylor's measure-

ments conform very closely to Peters' for *antricola*, particularly in the diagnostically important short ears and tibia (op. cit., p. 238; ear, 17.5, tibia, 17), so that *wrighti* is entirely applicable to the series of *antricola* at hand. The presence of a small triangular leaflet in front of the small, nearly obsolete, frontal pore mentioned by Taylor as characteristic of *wrighti* is variable. In the one alcoholic specimen that I have at hand this leaflet is absent, while in some of the dried skins it is noticeably present as it is in the dried skin of *bicolor*. Taylor also states that *wrighti* has a "short body and shorter tail" than *bicolor*, a difference that I find to be only very slight. The M. C. Z. series of nine individuals taken on three different islands helps to establish this race as a rather common, fairly wide-ranging member of the genus.

Distribution. The records from Mindoro and Marinduque are new; previously it has been reported from Luzon, and Hollister (1913, p. 309) reports a specimen from Mindanao which may belong to this species.

Hipposideros erigens spec. nov.

Type. An adult male, skin and skull, Museum of Comparative Zoölogy no. 35197, from the lower slopes of Mt. Halcon, northern side, near Calapan, Mindoro, P. I., collected 7 March, 1937, by Barbara Lawrence.

Description. The small bicolored bats of this genus show very little variation in color. This particular species only differs from the preceding in its paler ventral surface, where the bases of the hairs are white, the tips "drab" slightly washed with whitish. Two other specimens from the same locality are as dark as the type, a third has the tips of the hairs on the belly only faintly tinged with "tilleul-buff" deepening to "vinaceous-buff" laterally. The length of the forearm and of the hind foot fall within the limits of variation for *antricola;* however, the tibia is noticeably longer and the ears are larger in *erigens*. The noseleaf is larger than that of *antricola*, but as the shape and proportions are the same the difference appears less significant from measurements than it does to the naked eye. A further difference lies in the shape of the septum, which in *erigens* is wedge-shaped with the broad end more ventral, and there is no expansion of the inner margin of the horseshoe, so that the oval nostrils are clearly visible.

Skull. The skull is larger than that of *antricola* with a more pronounced sagittal crest, although the braincase itself is scarcely as deep; the lengthening of the skull shows particularly in the greater distance from the interorbital constriction to the front of the canine in *erigens*. The nasal swellings are also noticeably higher, the ear-bones

especially the bullae are larger. The upper and lower tooth rows are longer with a proportional increase in individual tooth size. Pm2/ is a well-developed tooth with a definite cingulum and a cusp that is higher than the cingulum of Pm4/. This is in sharp contrast with the condition that obtains in *antricola* where Pm2/ is a very much lower, peg-like tooth with, in some few cases, barely a trace of a cingulum.

Measurements. Measurements are given in the following order, two males 35197 and 35196, the type first, and two females 35195 and 35198. *External:* total length, 73, 75, 75, 80; tail, 26, 28.5, 28, 31; hind foot, 8, 9, 9, 8; ear, 21, 19, 19, 21; forearm, 42, 41, 43, 43; proximal end of tibia to tip of claws, taken on dried specimen, 26.0, 26.0, 26.4, 26.7; *cranial:* total length, broken, 17.8, 17.7, 18.3; total length to canine, broken, 17.7, 17.3, 18.0; basal length, 14.0, broken, 13.4, 14.0; palatal length 2.7, 2.6, 2.7, 2.7; zygomatic width, 8.7, 8.7, 8.6, 8.8; mastoid width, 8.9, broken, 9.0, 9.0; width outside molars, 6.0, 5.7, 6.0, 6.1; length upper cheek teeth, 6.2, 6.0, 5.9, 6.2; length lower cheek teeth, 6.4, 6.2, 6.2, 6.5.

Individuals of this species all taken from the same place agree in essential detail, and are most easily separated from specimens of *antricola* on the basis of their skull characters, although the larger ears, longer tibiae and differently shaped nasal appendages, are also important. These differences together with the fact that both forms seem to inhabit the same territory without interbreeding make it advisable to recognize *erigens* as a full species instead of a rather aberrant local development of the *bicolor* group. The two species appear to hang up in separate caves. In the large Tabucala Cave I found a great number of *erigens*. In the small one, as well as in some caves at Calapan on the coast, only *antricola* was taken.

Hipposideros pygmaeus is a third small member of the genus found in the Philippines that may be distinguished from the above two species by its smaller size; the tibiae are short, and the wing bones very slender, the forearm although actually short is longer in proportion to the other external measurements and this might conceivably lead the casual observer to confuse this form with the larger ones. Unfortunately I did not secure any specimens of *pygmaeus* myself, but the above notes were taken from specimens in the U. S. National Museum.

Distribution: Individuals referable to this new species include a long series from Luzon in the U. S. National Museum. It is possible that some specimens previously attributed to *antricola* may belong to this species.

FAMILY VESPERTILIONIDAE. SIMPLE-NOSED BATS

Myotis macrotarsus (Waterhouse)

Vespertilio macrotarsus Waterhouse, Proc. Zool. Soc. London, **13**, 1845, p. 3 (Philippine Islands).

Scattered records of this species have come from Luzon, Mindanao, Mindoro and Tawi Tawi; in each case they involve only one or two individuals. This series of twelve from the same cave on Marinduque adds to the list another island well within the expected range of occurrence. It also is interesting evidence that these little bats are not solitary but hang up in colonies in caves. The cave where these were collected was rather deep with a low ceiling and was a short distance from the sea shore.

Dobson (1878, p. 290) published a good account of the species to which Taylor added (1934, p. 281). Both had only alcoholic material and so were unable to give an adequate color description. In the specimens at hand the hair on the back is bicolored, the "buffy brown" tips almost entirely concealing the dark "mummy brown" bases. On the under side only the extreme bases of the hairs are dark, "bister," the tips, which give the characteristic color to the fur, being "cinnamon buff." This shade is brightest on the cheeks and chin where the hair is the same color throughout and on the throat where the dark bases begin to appear. There is a certain inconsiderable variation from a more gray to a more ochraceous tint in the tips of the hair.

Scotophilus temminckii (Horsfield)

Vespertilio temminckii Horsfield, Zoological Researches in Java: 1824 (Java).

The type locality of this species is Java where it is found in association with a race of the *castaneus* group described by Sody (1936, p. 49) as *solutatus*. It is interesting to note that all of the many Philippine records for *Scotophilus* appear to be for *temminckii*, which may be distinguished from *S. castaneus solutatus* by its smaller size, shorter forearm, smaller foot, ear and tragus as well as tail in which the individual vertebrae are noticeably very short. Of a series of six *S. castaneus solutatus* from Java three are dark, about "Prout's brown," two brilliant "burnt sienna" and one intermediate. The dark ones have the back washed with gold and the belly shiny "mustard yellow," brighter at the sides. Specimens of *temminckii*, on the other hand, from both Java and the Philippines have no trace of a golden sheen either dorsally or

ventrally. In a curious way this parallels the situation found here in New England where *Myotis lucifugus* and *Myotis sodalis* are practically the same size and very similar in color, only the one has very brassy looking tips on the hairs and the other is dull. Eleven specimens of *temminckii* from the Philippines are "cinnamon brown" above and "wood brown" to "vinaceous buff" below, very much as are the five Javanese ones. Extreme individuals of the former series are paler than any of those of the latter, but they intergrade very thoroughly and there is little size variation except for one exceptionally large female from Calapan that has a forearm measurement of 53.5. The series of *temminckii* from Java are slightly smaller than the measurements published for the species by Dobson (1878, p. 259), with the exception of the single large female mentioned above. Forearm measurements of the Philippine series range from 48 to 50 mm.

Four of the specimens at hand come from Mindoro Island and two from Cebu. This species has not previously been reported from either of these islands, although it is a common bat widespread in the Philippines. The rest of the series comes from Abra Province, Luzon.

Miniopterus paululus Hollister

Miniopterus paululus Hollister, Proc. U. S. Nat. Mus., **46**, 31 Dec. 1913, p. 311 (Guimaras, P. I.).

The smallest Philippine member of the genus *Miniopterus* is recognized as a distinct species and separated from *pusillus* and *australis* principally on the basis of size. A long series of alcoholic specimens as well as twenty-five skins and skulls agree with Hollister's description. Forearm lengths of the skins range from 35 to 38 mm., which is slightly larger than the average for the type series. However, there is no localizing of larger or smaller individuals and the range of variation for each colony comes close to the maximum. A comparison of the skins with a series of *australis* from New South Wales shows a certain average color difference between the two; the Philippine specimens tend to be darker particularly at the base of the hairs. In some of the Australian skins, the head is slightly paler than the lower back, a difference that none of the Philippine specimens shows. Also in the Philippine series the red phase is more richly colored and the percentage of these bright individuals is greater. Cranially, *paululus* is distinguishable by its noticeably smaller skull with a lower braincase and somewhat less projecting bullae.

The type and paratypes of this species come from Guimaras; Taylor

records three specimens from Luzon, and the series at hand adds the following islands to the list: Mindoro, where two were found with *eschscholtzii* in caves near Calapan and a large number in the caves on the lower slopes of Mt. Halcon; Marinduque and Mactan, where both species were taken in the same caves, *paululus* predominating. A few specimens come from Abra Province and one is from Baguio in the Mountain Provinces of Luzon. Without going over the actual material attributed to *australis* and *pusillus* it is impossible to pass on the accuracy of their identification; possibly certain of the Philippine records for both species should be considered *paululus* and a few of those for *pusillus* in reality may refer to *eschscholtzii*.

Miniopterus eschscholtzii (Waterhouse)

Vespertilio eschscholtzii Waterhouse, Proc. Zool. Soc. London, **13**, 1845, p. 3 (Philippine Islands).

Hollister (1913, p. 311) believes that the Philippine medium-sized *Miniopterus* is distinct enough from the European *schreibersii* to warrant specific recognition, and revives the name which Waterhouse originally applied to some of Mr. Cumings' specimens from the Philippines. Taylor (1934, p. 272) follows Hollister, although a comparison of his specimens from Zamboanga and Tablas with Waterhouse's account raised some doubt in his mind as to whether they actually were the species to which the original description had reference, particularly as his individuals lack the naked groove which, according to this account "runs over the eye." This groove is lacking in my specimens also, and, as no mention is made of a very marked groove running below the eye, I think it highly probable that it is the latter which Waterhouse had in mind. The measurements of the type are clearly those of one of the medium-sized members of the genus which, I believe, in the Philippine Islands all belong to the same race. If this is the case, there should be no difficulty about the use of the name *eschscholtzii* for this group in spite of the rather general type locality.

The material at hand includes long series from near Calapan, Mindoro; a few from near Torrijos, Marinduque Island, and from Mactan Island across the channel from Cebu; also a long series from the Misamis district on Mindanao. This extends their known range westerly and adds several islands to the list of localities where they have been taken; these included Luzon, Samar, Guimaras, Mindanao and Tablas.

Miniopterus tristis (Waterhouse)

Vespertilio tristis Waterhouse, Proc. Zool. Soc. London, **13**, 1845, p. 3 (Philippine Islands).

One alcoholic specimen from Calapan on Mindoro was sent to the Museum of Comparative Zoölogy by Pedro de Mesa. Although I subsequently took long series of the smaller species of *Miniopterus* from caves near this town, presumably the same ones where de Mesa collected, I caught none of this largest form. It is evidently considerably more rare than either of the other species from which it may readily be distinguished by its much larger size. Hollister gives the forearm length for a single specimen from Lubang Island as 51.9 mm., the one at hand measures 52.8 mm.

FAMILY MOLOSSIDAE. FREE-TAILED BATS

Chaerephon luzonus Hollister

Chaerephon luzonus Hollister, Proc. U. S. Nat. Mus., **45**, 31 Dec. 1913, p. 312 (Cagayan, Cagayan Province, Luzon).

A good series of both alcoholics and skins and skulls agrees with Hollister's description of the type in being paler and smaller than *C. plicatus* (Buchannan). Comparison of the series at hand with a good series of *plicatus* from Java shows that the difference in length of forearm in the two species is more pronounced than the difference in foot length. The specimens all came from the Montalban Caves near Manila. Taylor (1934, p. 311) lists a long series collected in the same place, stating that this species was the most numerous when he collected there. This was also the case when I visited the caves.

Cheiromeles parvidens Miller and Hollister

Cheiromeles parvidens Miller and Hollister, Proc. Biol. Soc. Washington, **34**, 20 June, 1921, p. 100 (Pinadapa, Middle Celebes).

Although only one specimen of *Cheiromeles* was taken in the Philippines, there seems to be little doubt that it is much more closely related to the small Celebean *Cheiromeles parvidens* than to the larger *C. torquatus* of Java and Borneo. Comparison of Miller and Hollister's type with the specimen at hand from Bignay, Mt. Halcon, Mindoro, shows the very sparse fur on the under surface, and around the sides of the face and the base of the tail, as well as the "brush" on the first toe to be a redder brown than in the Celebean specimen. In all other

respects, external measurements, size of the skull and length of the tooth rows, there is little to choose between the two individuals. Compared with a specimen from Borneo the difference in size with the disproportionately smaller teeth described as characteristic for *parvidens* holds true for the Mindoro individual as well. Taylor (1934, p. 321), who published the first record for this genus from the Philippines, lists four specimens from Saub, Catabato, Mindanao, as *C. torquatus* and gives measurements that come very close to those of the Mindoro individual and are decidedly less than those of the Bornean one. Only these five specimens have been recorded from the Philippines. The one from Mindoro was shot while flying at dusk. The others Taylor states (op. cit., p. 323) were found in a hollow tree.

FAMILY GALEOPTERIDAE. FLYING LEMURS

Cynocephalus volans (Linnaeus)

Lemur volans Linnaeus, Syst. Nat., ed. 10, **1**, 1758, p. 30 (Pampanga, southern Luzon, P. I.).

One young male, skull only, was collected at Davao on Mindanao.

FAMILY TARSIIDAE. TARSIERS

Tarsius carbonarius Heude

Tarsius carbonarius Heude, Mém. Hist. Nat. Emp. Chinois, **4**, pt. 4, 1899, p. 164 (Gulf of Davao, Mindanao, P. I.).

A single specimen probably referable to this species, was collected on Basilan near Lamitan. I have been unable to find any previous records for the genus from this island.

FAMILY CERCOPITHECIDAE. Macaques

Macaca philippinensis (Is. Geoffroy)

Macacus philippinensis Is. Geoffroy, Arch. Mus. d'Hist. Nat. Paris, **2**, 1841, p. 568 (Philippine Islands [purchased in Manila]).

This species is represented in the collection by a young male and a somewhat older female from Lagangilang, Abra Province, Luzon.

Macaca mindora (Hollister)

Pithecus mindorus Hollister, Proc. U.S. Nat. Mus., **46**, 31 Dec. 1913, p. 328 (Alag River, Mindoro, P. I.).

Three specimens were caught at Pinamalayan, and one at Pola, Pasi, on Mindoro. A young female of this series, when compared with a slightly older female from Lagangilang, Abra Province, agrees with Hollister's description in being more richly colored and in having a wide shallow palate.

FAMILY MUSTELIDAE. WEASELS, MARTENS, ETC.

Suillotaxus gen. nov.

Type species *Mydaus marchei* Huet.

Characters. The hog badgers of the East Indian region fall into two well-defined groups which, although obviously closely related, have such a divergent pattern of development as to make their separation much more nearly a generic than a specific one. *Mydaus*, originally given by Cuvier to the Javanese animal, should be retained for the small-toothed, longer-tailed ones from Java, Sumatra, Borneo and the Natuna Islands. For the broad-toothed, short-tailed form from Palawan and the Calamianes Islands in the Philippines I propose *Suillotaxus*. Externally this genus may be distinguished by its vestigial, very thinly haired tail, referred to by Huet in his original description of *marchei* as "tubercule sans poils," and by the reduction of the external ear. The color and distribution of the hair, although more truly specific characters, are also quite different in the two genera. In *Mydaus* there is a pronounced white patch on the head which extends in a line of varying width down the back, it may be broadly continuous on the tail which is always white tipped, or it may be interrupted for a short space in the middle of the back. In *Suillotaxus* there is only a scattering of silvery hairs over the back, sometimes concentrated on the top of the head.

Cranial characters. The size of the teeth, the number of cusps on the fourth upper premolar and the shape of the bony meatus of the ear are the most distinctive features. In general proportion the skulls of *Mydaus* and *Suillotaxus* are not strikingly different. *Mydaus* has the palate longer with the premaxillary portion of the skull drawn out so that the nasal aperture slopes backwards and appears more excavated than in *Suillotaxus*. The auditory meatus in *Mydaus* is elongated into

a funnel-shaped projection which appears almost as large as the bulla itself. This is a very curious development and quite different from the relatively shorter tubular opening found in *Suillotaxus*. The tooth formula is the same in both genera:

$$\text{I } \frac{3}{3},\ \text{C } \frac{1}{1},\ \text{Pm } \frac{3}{4},\ \text{M } \frac{1}{1}$$

but *Suillotaxus* has the teeth much heavier than *Mydaus*. Pm2/ in the latter is much flattened with a single bladelike cusp and a faint indication of a talon; in *Suillotaxus* the cusp is peg-like with a broad solid base and the tip drawn into a point; there is a distinct talon which is continued internally around the base of the posterior root in a slight cingulum. Pm4/ in *Mydaus* has *two* external cusps separated by a deep notch; the anterior one is as high as Pm2/, the posterior one as M1/; together they form a flattened delicate outer margin which is separated by a deep hollow from the ridge along the inner margin, all that remains of the inner cusp. The single outer cusp of Pm4/ in *Suillotaxus*, placed more antero-centrally than laterally, is triangular in profile and widens internally at the base to include one half to two thirds of the tooth; there is a slight but well-defined cusp on the postero-internal side. In the region of Pm4/ the axis of the tooth row is slanted diagonally outwards, probably because the alveolar margin spreads widely at the root of the zygoma in order to accommodate the greatly increased bulk of the last molar. M1/ in *Mydaus* is small, only slightly larger than Pm4/; the outer cusps are low and the inner one is scarcely more than a ridge separating the bulk of the tooth from the narrow heel. In *Suillotaxus* M1/ is almost twice as large as Pm4/, the inner cusp is almost equal in bulk to the postero-external one and the talon forms a low, wide shelf projecting from the inner and posterior margins of the tooth so far that a line from the inner cusp to the notch on the posterior margin divides the tooth in halves. The teeth in the lower jaw also, with the exception of M/2, are broader and the cusps heavier in *Suillotaxus*, Pm/1 instead of being peg-like is elongated antero-posteriorly, Pm/2 and Pm/3 have a low cingulum on the inner side that forms a slight cusp anteriorly when seen in profile and a pronounced heel posteriorly. In *Mydaus* there is no cingulum on these premolars and only a trace of a heel. Pm/4 in *Suillotaxus* is a large heavy tooth with all three cusps about equal in size whereas in *Mydaus* the tooth is much smaller and the outer cusp is so flattened on top as to be scarcely higher than the talon. In both genera M/2 is about the same size.

Since Cuvier's description of *Mydaus* in 1821, later writers have confined themselves almost entirely to a study of the inter-relationships of the various races and to notes on their habits. The Philippine animal was first described by Huet (1887, p. 149) from a specimen from Palawan which he called *Mydaus marchei*. He mentions particularly the very short tail and the absence of a white line on the back. Jentink (1895, p. 46) describes another form, *schladenbergi* from the Calamianes Islands, P. I., and calls attention to the unusually large molariform teeth, especially Pm/4 in the Philippine animals as compared to specimens from Java and Borneo. His early remarks on the very pronounced differences between the Calamianes Island animal and those from Java, Borneo and Sumatra are amply verified in this further comparison of individuals from the two areas. The sturdy type of dentition that is found in *Suillotaxus* with strong cusps and ridges on the large teeth has little in common with the much less powerful dentition of *Mydaus* where the cusps are thin and bladelike, an adaption for cutting which is further evidenced by the presence of two cusps instead of one on the outer side of Pm4/; this together with the development of the ear bones, the larger external ear and the longer tail in *Mydaus* points to a progressively different line of development in both genera rather than the isolation of the Bornean type of animal on Palawan and the adjacent islands and its subsequent differentiation.

Suillotaxus marchei (Huet)

Mydaus marchei Huet, Le Naturaliste, II, 9^{e} année, 13, 15 September 1887, p. 149 (Palawan).

This species is represented by a single specimen from Puerto Princesa, Palawan. An additional specimen in the U. S. National Museum taken at Iwahig on the same island was also examined.

FAMILY VIVERRIDAE. CIVETS

Paradoxurus philippinensis Jourdan

Paradoxurus philippinensis Jourdan, Compt. Rend. Acad. Sci. Paris, **5**, 1837, p. 523 (Philippine Islands, Luzon and Mindanao).

This species is represented in the collection by three specimens from Puerto Princesa and one from Brooke's Point on Palawan; by a specimen from Baguio, Mountain Provinces, and one from Bangued, Abra Province, on Luzon and by one from Maluso on Basilan. The Palawan

animals show considerable color variation with more or less dark on the center and lower back and the sides more or less washed with golden ochraceous. In all of them the three shadow stripes in the center of the back are faintly traceable while in the Luzon individuals, which are younger, there is no tendency for the dark area to fall into any pattern of stripes or spots.

Viverra tangalunga Gray

Viverra tangalunga Gray, Proc. Zool. Soc. London, 1832, part 2, p. 63 (type locality not given).

Hollister (1913, p. 313) states that comparison of six specimens from the Philippines with a series of sixty from Sumatra, Borneo and the smaller Malayan Islands shows not the slightest constant character to allow for subdividing them. The two specimens at hand came from Palawan, and Lagangilang, Abra Province, Luzon.

Arctictis whitei Allen

Arctictis whitei Allen, Bull. Amer. Mus. Nat. Hist., **28**, 29 Jan. 1910, p. 15 (Iwahig Penal Colony, Palawan).

Few individuals of this species have been recorded. The original description refers to four specimens from Iwahig. This additional example is a subadult male taken near Brooke's Point on the southeast coast of Palawan.

FAMILY SCIURIDAE. SQUIRRELS

Nannosciurus concinnus (Thomas)

Sciurus concinnus Thomas, Ann. Mag. Nat. Hist., (6), **2**, 1888, p. 407 (Isabela, Basilan, Philippines).

Description. Six of the seven skulls examined have a small upper Pm3, the absence of which in the type Thomas considered important in separating his new species. In the seventh skull there are only four molariform teeth, but it is possible that the first is only a milk tooth, and might later have been replaced by a small Pm3 as well as Pm4. Although, in this respect, my series does not agree with Thomas's description, there can be no doubt that *N. concinnus* is a valid species which may readily be separated from *Nannosciurus exilis* by its larger size, bigger hind foot and longer, bushier tail. The shape of the posterior sole-pad is difficult to make out in dried specimens, but, as Thomas notes, the hair on the sole extends much farther towards the

toes in *exilis* than it does in *concinnus;* in the former it is some shade of buff, while in the latter it is grizzled like the upper surface of the foot. Also the more uniformly colored back and tail in *N. concinnus* serve to distinguish the two.

The single specimen that Taylor (1934, p. 370) collected, was the only one he saw in one and one half months' collecting on the island. In the partially cleared places where lumbering had been carried on, I found them rather common and not particularly shy. Their habit of running along fallen logs and whisking in and out of holes is very reminiscent of chipmunks. This species appears to be limited to Basilan. Various other forms, probably closely related, have been described from the nearby islands (Taylor, 1934, p. 368).

Tomeutes philippinensis (Waterhouse)

Sciurus philippinensis Waterhouse, Proc. Zool. Soc. London, **7**, 1839, p. 117 (Philippine Islands).

Both *S. mindanensis* and *S. philippinensis* have been reported as occurring on Basilan as well as on Mindanao. The series at hand of four specimens from near Maluso, Basilan, shows little variation in color and represents obviously only one species. In the absence of sufficient comparative material it is impossible to determine just how the two above-mentioned species differ, so I have followed Hollister (1913, p. 314) who calls the Basilan animal *philippinensis.*

FAMILY PETAURISTIDAE. FLYING SQUIRRELS

Pteromys (Petinomys) crinitus (Hollister)

Sciuropterus crinitus Hollister, Proc. Biol. Soc. Washington, **24**, 23 June 1911, p. 185 (Basilan Island, P. I.).

One adult male from near Maluso, Basilan, agrees with Hollister's description of the type, which I have been unable to examine. This is the second specimen to be recorded and was brought in alive by natives who caught it as it escaped from a felled tree.

FAMILY MURIDAE. TYPICAL RATS AND MICE

Phloeomys pallidus Nehring

Phloeomys pallidus Nehring, Sitz.-ber. Ges. Nat. Freunde Berlin, no. 6, 17 June 1890, p. 106 (Luzon).

Two species of *Phlocomys* have been reported from northern Luzon: *P. pallidus* which Thomas says differs from the second one, *P. cumingi*, by its "larger size, longer and much softer fur and paler colour" (1896, p. 400). Hollister (1913, p. 315) calls all three specimens in the U. S. National Museum *pallidus*. Measurements of the single specimen at hand caught near Baguio are almost identical with those that he publishes for one from Haights-in-the-Oaks also in the Mountain Provinces.

Rattus basilanus (Hollister)

Mus basilanus Hollister, Proc. U. S. Nat. Mus., **46**, 31 Dec. 1913, p. 322 (Basilan Island, P. I.).

On Basilan a series of five specimens was caught in livetraps set along the edge of a rubber plantation. On Mindanao, near Zamboanga, one adult and two young specimens were caught under piles of debris in a coconut plantation; the adult is very like the series from Basilan with no noticeable size difference. Hollister in his original description of the latter notes particularly that *basilanus* is smaller than *R. todayensis* Mearns (1905, p. 445). None of his comparative material comes from Zamboanga and it is likely that the lowland form there is actually the same as the one on Basilan Island and that *todayensis* should only apply to the form found in the eastern part of Mindanao.

Rattus calcis (Hollister)

Epimys calcis Hollister, Proc. Biol. Soc. Washington, **24**, 15 May 1911, p. 89 (Baguio, Benguet Province, Luzon, P. I.).

Four specimens were taken near Baguio in the Mountain Provinces. Although the difference in color, when this series is compared with a single specimen of *quercti* from Abra Province, is not as pronounced as the original description indicates, the larger size of the latter, especially the longer and more heavily ridged skull, and the harsh spiny fur, easily distinguish it.

Rattus everetti (Günther)

Mus everetti Günther, Proc. Zool. Soc. London, 1879, p. 75 (type locality probably Dinagat or Mindanao [Taylor, 1934, p. 419]).

Four rats belonging to the group with bicolored tails were taken near Baguio and are all called *everetti*. Thomas (1895, p. 163) distinguishes a second species of half white-tailed rat, *Mus luzonicus*, of the same size as *everetti* with longer fur, shorter tail and differing

slightly in certain details of the skull. Hollister (1913, p. 324) puts this into the genus *Bullimus* of Mearns. Although two of the individuals examined have the shorter tail and slightly smaller bullae mentioned by Thomas as typical of *luzonicus*, the other cranial characters are too intermediate to be diagnostic.

Rattus mindanensis mindanensis (Mearns)

Mus mindanensis Mearns, Proc. U. S. Nat. Mus., **28**, 1905, p. 442 (Todaya, Mt. Apo, Mindanao).

This species is represented by three specimens from Baguio in the Mountain Provinces and two from Lagangilang, Abra Province, both on Luzon.

Rattus querceti (Hollister)

Epimys querceti Hollister, Proc. Biol. Soc. Washington, **24**, 15 May 1911, p. 90 (Haights-in-the-Oaks, Benguet Province, Luzon, P. I.).

This species is represented in the collection by a single specimen from Lagangilang, Abra Province, Luzon.

Rattus datae (Meyer)

Mus datae Meyer, Abhandl. und Berichte der Königl. Zool. Mus. Dresden, **7**, no. 7, 1899, p. 25 (Mt. Data, Luzon, P. I.).

Two specimens from Baguio in the Mountain Provinces have the under surface pale grayish white with no trace of the "naphthaline yellow wash" mentioned by Hollister (1913, p. 323) as typical of *datae*. The contrast between this and the buff verging on ochraceous of the under surface in the type of *benguetensis* is very pronounced.

Crateromys schadenbergi (Meyer)

Phlocomys (?) *schadenbergi* Meyer, Abhandl. und Berichte der Königl. Zool. Mus. Dresden, **5**, no. 6, 1895, p. 1 (Mt. Data, Luzon).

The single specimen in the collection is of the very dark variety and was brought in alive by the Igorots. I saw a second very much paler one that was being kept as a pet.

Apomys major Miller

Apomys major Miller, Proc. U. S. Nat. Mus., **38**, 1911, p. 402 (Haights-in-the-Oaks, Benguet, Luzon, P. I.).

Two examples of this species were taken near Baguio, Mountain Provinces, Luzon.

FAMILY MANIDAE. PANGOLINS

Paramanis culionensis (Casto de Elera)

Pholidotus culionensis Casto de Elera, Contribución a la Fauna Filipina, Manila, Colegio de Santo Tomás, 1915, p. 274 (Culion Island).

Description. Three pangolins from Puerto Princesa, Palawan Island, agree in almost every detail with Fr. Casto de Elera's description of the external characters of an individual from Culion Island. Unfortunately, *culionensis* was first published as a *nomen nudum* in Elera's "Catálogo Sistemático de toda la fauna de Filipinas conocida hasta el presente y á la vez el de la Colección Zoológica del Museo PP. Dominicos del Colegio-Universidad de Santo Tomás de Manila," a three-volume work published in 1895 by the Colegio de Santo Tomás containing an extensive synonymy, the native names, the distribution of a vast number of species, but no descriptions. After Elera's death his notes on Philippine mammals were collected and published by Fr. Florencio Llanos, director of the Museum of the Colegio of Santo Tomás. In this later work there is a detailed account of the external characters and of the habits of *culionensis* together with a picture, presumably of the type. Culion and the Calamianes are the only localities given for this species and *P. javanica* is mentioned as occurring on Palawan. Hollister (1912, p. 35) gives *javanica* for Palawan on the strength of the records of Casto de Elera and of Bourns and Worcester. Taylor (1934, p. 69) describes a pangolin in the possession of "Mr. Macasaet, Iwahig," Palawan, as having three rows of keeled scales on the tail and seven on the hind legs. In the absence of sufficient comparative material he calls it *javanica* and puts *culionensis* into the synonymy. If this individual actually did come from Palawan it appears likely that there are two species on this island, one with smooth and the other with keeled scales. The three individuals at hand are so distinct from a topotypical specimen of *javanica* as to make any confusion between the two impossible, all are very pale, a rather dirty yellowish white, with translucent scales that are extraordinarily thick, the heaviest ones resembling in texture a coarse, horny toenail. On the scales of the dorsal surface of the tail, the head and the limbs, a well-defined line separates the whiter basal part that is attached to the skin from a narrow, dark, free margin. A similar line on the scales of the back is more difficult to discern as the free portion of the scale is longer. The scales in *javanica* are thin with pronounced longitudinal striations on their outer surface and a smooth under surface; those of

culionensis are tremendously heavy with only a few striations visible at the extreme base of some of the scales, especially those of the lower back and the upper tail. On the under surface they all have a series of ridges running parallel with the distal line of attachment of the skin. The ridges seem to mark the growth of successive layers of horny substance; the free margin of the scale formed in this way is brittle, the layers breaking unevenly very much the way a fingernail breaks. Except for the folded scales on the outer margin of the tail, and, on the posterior side of each hind leg, one row of not more than four very slightly peaked scales, there is no trace at all of the ridging that is so prominent on the scales of the sides, the hind legs, and to a lesser degree the fore legs of typical *javanica*. The outline of the individual scales is also very different in the two species, in *culionensis* the distal edge of the scales of the anterior back is three sided, resembling half a hexagon; in *javanica* it is evenly rounded or else drawn down into a slight point. On the lower back in the latter the point becomes more pronounced, but in the former the scales of this region are so broken as to make it impossible to determine their exact shape although the tendency is away from the three-sided margin with marked angles to a more evenly curved, very broad scale. In *javanica* the keeled scales of the sides are long and pointed, in *culionensis* the distal edges of the flat scales on the sides are evenly rounded some of them actually semicircular. A similar difference obtains for the much smaller scales on the fore and hind limbs of both species. In *culionensis*, on the posterior half of the head, the scales are much smaller than those of the few rows anterior to the eyes, whereas in *javanica* there is a gradual increase in size from the scales at the end of the snout to those on the neck. Most striking is the difference in the two species in proportion of the three scales in the diagonal row immediately above the proximal folded scale on the lateral margin of the tail. In *culionensis* the middle one of these measures from one and one half to twice as long as the scale immediately overlying it, whereas in *javanica* it is only slightly longer than the ones overlying it. Behind the shoulder there is a similar but not so extreme difference in size between the two scales that form the diagonal continuation of the posterior rows on the fore limb and the scales overlying them. On the under surface of the tail in *culionensis* the central row of scales has been modified in a way which I have not observed in any other of the genera of pangolins: the central portion of the scale grows into an almost parallel-sided projection flat at the end, sometimes as long as 5 mm. with the result that the detached margin of the scale follows parallel to the line of attachment of the skin for one

third of the width of the scale on each side. The central third has the free edge of the scale sometimes as much as four times as wide as it is on the sides. *P. culionensis* may further be distinguished by its large, very stout claws. The fourth claw on the front foot is longer than the second whereas in *javanica* these two are almost equal in length. In dried specimens the tail, measured from the tip to the end of the row of folded scales, is almost as long as the head and body in *culionensis*, whereas in *javanica* it is from two thirds to three quarters as long. In the former, the extreme tip has the horny almost scale-like pad mentioned by Pocock as characteristic of *Paramanis*. The pinna of the ear is a thicker, more projecting fold in *culionensis* and is further characterized by a scale actually growing on the upper margin close to the point of attachment to the head.

Externally *culionensis* differs from the other described forms to such an extent as to make its generic classification very difficult. Pocock (1924) separates the pangolins into six genera on the basis of the shape of the sternum and various external characters. The specimens at hand are all females so it remains to be determined later whether or not males of this species have the "deep, probably glandular," depression behind the anus said by Pocock (1924, p. 723) to be typical of the subfamily *Maninae;* as we have no skeletons the same holds true for the shape of the xiphisternum. From an examination of dried skins, the pinna of the ear in the Palawan animal appears more highly developed than in typical *Paramanis* but not as much so as in typical *Manis*. The proportions of the claws and the membranous pad at the tip of the tail seem to ally this form most closely with *Paramanis*. In spite of the very different external appearance of the two species, the skulls of *culionensis* resemble those of *javanica* much more closely than they do those of any other genus of pangolin. In both, the skull is long with an incomplete zygomatic arch whose vestigial roots are widely separated, the zygomatic process of the maxillary is a particularly slender weakly developed bony projection, the inflation of the maxillary bones along the margin of the palate is much slighter than in *Phatages* and the ventral projection of the premaxillaries between the maxillaries is much longer than in *Manis*.

Skull. Cranially, *P. culionensis* may be distinguished from *javanica* by its remarkably slender skull. The rostrum particularly is elongated, the premaxillaries project well beyond the tip of the nasals and the lateral maxillo-premaxillary suture extends much farther posteriorly than the notch in the nasal bones. The nasals are long and slender and the greatest width, instead of being at the point where the nasals,

frontals and maxillaries join, is across the lateral projections of the nasals at the extreme tip of these bones. On the palate, posterior to the ventral projection of the premaxillaries, the maxillaries are further separated by a thin edge of the vomer varying from 9.1 to 11.0 mm. in length. The zygomatic process of the maxillary is a peg-like projection constricted at the base instead of being slender, flattened and triangular in outline when viewed from the side. The posterior margin of the palate is marked by two small, rounded knobs of bone in *culionensis,* there is no notch immediately back of them, and the lateral margins of the pterygoid fossae are on the same level as the palate instead of being markedly lower as is the case with *javanica.*

Distribution. From the evidence at hand *culionensis* appears to be a very divergent species of *Paramanis* occurring on Culion, Calamianes, and Palawan. Possibly there is another species of pangolin of the *javanica* type with keeled scales on some of these islands; however, it seems more likely that all of the records of *javanica* from the Philippines should be attributed to *culionensis.*

FAMILY TRAGULIDAE. MOUSE-DEER

Tragulus nigricans Thomas

Tragulus nigricans Thomas, Ann. Mag. Nat. Hist., (9), **6**, March 1892, p. 250 (Balabac Island, P. I.).

The collection contains four topotypical specimens of this species.

BIRDS

By James L. Peters

Miss Lawrence herself collected birds during her stay on Luzon, Mindanao and Basilan at the localities mentioned in the Introduction, but for her visit to Mindoro she was very fortunate in securing temporarily the services of Mr. Francisco Rivera of the Philippine Bureau of Science. Mr. Rivera collected birds only, and was employed off and on from early in March until near the middle of May, in that period securing an even 500 birds from the following localities on Mindoro:

Naujan: Lake Naujan, Ariaod, Merit, Bayog, Salibagon

Calapan: Calawang, Paltabaan, Carayrayan, Anuling, Binugsucan, Alsanagon

Pola: Subaan, Pasi, Antipolo

Baco: Casungo

and at Bignay on the slopes of Mt. Halcon.

ANHINGIDAE

Anhinga rufa melanogaster Pennant

Mindoro: Lake Naujan, 1 ♀, 7 March, 1937.

ARDEIDAE

Ardea purpurea manilensis Meyen

Mindoro: Calawang, 1 ad. ♂, 1 imm. ♀, 10 May, 1937.

The adult is in somewhat worn nuptial plumage.

Butorides striatus javanicus (Horsfield)

Mindoro: Ariaod, 1 ♀, 16 April, 1937.

Bubulcus ibis coromandus (Boddaert)

Mindoro: Paltabaan, 1 ♀, 15 April, 1937.

Salomonsen (1929, pp. 347–357), following the lead set by the editors of the Practical Handbook of British Birds, **2**, 1921, p. 208, unites the genera Ardeola and Bubulcus. While genera are in part a matter of convenience and of opinion, it seems to me that the various species of

Ardeola make up a natural group, the homogeneity of which is broken by the inclusion of *Bubulcus ibis*. Heron genera are difficult to define, since there is a great similarity in the external characters of all of them, and if some emphasis is not laid on the character of the nuptial plumes, there is little left on which to base a convenient generic arrangement.

Egretta garzetta garzetta (Linné)

Mindoro: Merit, 1 ♂, 6 March, 1937.

In the first volume (1931, p. 111) of my Check List I included the Philippines as well as the Sunda Islands in the range of *E. g. nigripes*. As a matter of fact the latter form probably does not have a very extensive range; certainly Miss Lawrence's bird is much more like specimens of *garzetta* from China than like *nigripes* from Java. Chasen (1935, p. 56) includes Sumatra and Borneo in the range of *garzetta*, attributing *nigripes* only to Java with certainty.

Nycticorax caledonicus manillensis Vigors

Mindoro: Carayrayan, 1 imm. ♀, 12 April, 1937.

The wing of this specimen measures 307, culmen from frontal feathering, 70.5 mm.

ACCIPITRIDAE

Elanus caeruleus hypoleucus Gould

Mindoro: Calawang, 1 ♀, 6 April, 1937.

This race differs chiefly from *E. c. vociferus* of southeastern Asia in having only the terminal half, or less, of the primaries black; the basal portion is white, shading into the black tip through a freckled area; in *vociferus* the entire exposed under surface of the primaries is black. *E. c. hypoleucus* is also more purely white below, lacking the pale grayish wash on the sides of the breast so evident in *vociferus*.

Haliastur indus intermedius Blyth

Mindoro: Casungo, 1 ♀, 1 May; Ariaod, 1 ♀, 7 May, 1937.

Both perfectly typical examples of this wide ranging form; the bird shot at Casungo has the whole head and breast lined with narrow dusky shaft stripes, while in the Ariaod specimen these stripes are missing, their place being taken by faint rusty frecklings, most noticeable toward the base of the feathers.

Accipiter virgatus confusus Hartert

Luzon: near Bangued, 1 ♀, 31 January, 1937.

This specimen is obviously a bird hatched the previous summer, and the fact that the closely related *A. gularis* occurs in the Philippines during the winter months, makes it necessary to exercise more than usual care in making the identification. The wing measures 171.5 mm. as against 181.5–194 for *gularis;* middle toe (without claw) 33 as against 29.7–32.9; tarsus longer, 54 for *confusus,* 49–53 for *gularis.* These proportional differences, *i.e.,* shorter wing and longer tarsi and toes, coupled with some feathers on sides of breast which are deeper and more extensively reddish brown, would seem to preclude the possibility of confusing the specimen with *gularis.*

A. v. confusus is evidently the endemic form of *A. virgatus* in the Philippines; the possibility of the occurrence of *A. v. affinis* Hodgson, which occurs in winter on the opposite mainland and the islands of Formosa and Hainan must also be considered.

Butastur indicus (Gmelin)

Luzon: near Bangued, 1 ♀, 29 January.

Mindoro: Merit, 2 ♀, 6 March, 1937.

Spizaëtus cirrhatus limnaeetus (Horsfield)

Mindoro: Ariaod, 1 ♂, 8 May, 1937.

Ichthyophaga ichthyaetus ichthyaetus (Horsfield)

Mindoro: Carayrayan, 1 ♂, 12 April, 1937.

Spilornis holospilus (Vigors)

Mindoro: Calawang, 1 ♂, 30 April; Casungo, 1 ♂, 1 May; Ariaod, 1 ♂, 7 May; Subaan, 1 ♂, 14 March.

Basilan: 15 km. northeast of Maluso, 1 ♂, 25 April; near Isabela, 1 ♀, 12 May, 1937.

McGregor (1909, pp. 228–230) recognized two "species" of Spilornis (exclusive of the Palawan group) from the Philippines; *holospilus* (type locality, Luzon) inhabiting Basilan, Bongao, Catanduanes, Cebu, Leyte, Luzon, Marinduque, Mindanao, Mindoro, Samar, Sulu and Tawi Tawi, and *panayensis* found on Bohol, Guimaras, Masbate, Negros, Romblon, Sibuyan, and Tablas.

The distinguishing characters given for *panayensis* as opposed to *holospilus* were breast and abdomen lighter; chin and throat light gray (instead of blue-gray); size smaller. Even so McGregor regarded the validity of *panayensis* as "somewhat doubtful."

Hachisuka (1934, pp. 22–23) disposed of *panayensis* as a synonym of *holospilus* as "a pale individual variety" since both occurred at Davao, Mindanao.

As a matter of fact the lumping of all the Philippine Serpent Eagles under a single name is an easy way of avoiding a complicated situation. Miss Lawrence's series reenforced by two other specimens from Mindanao indeed show the hopelessness of trying to subdivide on color characters; there is a tremendous range of individual variation, but if the sexing is to be relied on at all, it will be seen from the attached table that the Mindoro birds run much larger than specimens from either Mindanao or Basilan, although all these three islands lie within the range of *holospilus* as defined by McGregor. Lacking topotypical material of either race and no representation from any other islands except those listed, it is not possible to draw any final conclusions.

Basilan	♂	wing 332	tail 240	tarsus 77
	♀	335	235	78
Mindoro	♂	368	255	87.5
	♂	370	245	84
	♂	372	241	90
	♂	380	263	94
Mindanao	♂	338	235	78
	♀	338	230	81

McGregor gives for *holospilus* wing 368; tail, 254; tarsus, 90; and for *panayensis* wing, 317; tail, 229; tarsus, 71.

Whether these measurements represent an average for a series, or are those of a single specimen of each is not stated. Hachisuka copies McGregor's figures without adding any of his own. Swann gives for *holospilus* ♂ wing 341, ♀ wing 367.

FALCONIDAE

Microhierax erythrogenys (Vigors)

Mindoro: 1 ♀, Pasi, 5 March, 1937.

Ogilvie-Grant (1897, p. 220) described *M. e. meridionalis* (Samar, Cebu and Mindanao) as considerably larger than *erythrogenys*, the under wing coverts and inner webs of the primaries uniform black in

the ♂ (instead of being barred with white as in ♂ of *erythrogenys*); and belly, vent and undertail coverts washed with pale fulvous. McGregor (1909, pp. 238–239) commented that *meridionalis* was of doubtful validity but that the name might be retained until more specimens had been examined. He also pointed out that the white bars on the inner webs of the primaries were an age characteristic due to immaturity and that adult males did not possess them. Hachisuka (1934, pp. 36–37) repeated what McGregor had published about the two forms, but omitted McGregor's statement about the doubt attached to the distinctness of *meridionalis* and the remark about barred primaries.

While the material available to me is very inadequate, consisting only of a ♂ and two ♀ from Mindanao (*meridionalis*) and the Rivera specimen from Mindoro (*erythrogenys*, but not topotypical), it seems as though Grant's distinctions broke down at once. The Mindanao ♂ has a few white spots on the inner primaries and the belly, vent and undertail coverts are white, not "washed with pale fulvous"; one of the ♀, worn and molting, has the primaries spotted on the inner web with white and moreover a new inner primary just growing in has white spots; there is a faint "pale fulvous" wash on the belly; the other ♀ has the under surface of the primaries entirely black, but belly, etc. are pure white. The Mindoro bird is like the second Mindanao bird but belly, etc. with "pale fulvous" wash. Thus it will be seen that the color characters break down completely. The following table of measurements is based on the four specimens already discussed, plus the measurements published by McGregor

		wing	tail	culmen	tarsus
♂	Bohol (McGregor)	110	63	13	
♂	Mindoro (McGregor)	110	68	11	20
♂	Mindanao (MCZ)	118	62.5	12	21
♂	Mindanao (McGregor)	113	66	13	22
♀	Luzon (McGregor)	110	66	12	
♀	Mindoro (MCZ)	116.5	69	11.2	20.2
♀	Mindanao (MCZ)	102 (worn)	63	12.3	21.5
♀	Mindanao (MCZ)	114.5	69	13.7	23
♀	Samar (McGregor)	117	70	13	22

Grant's wing measurements (converted from inches and hundredths) are for ♂ Luzon: 103, 102, 103; Samar: 109; Mindanao: 110.5, 115.6. For ♀ Luzon: 108, 108, 108, 110.5, 115.6; Cebu: 122; Samar: 117, 117; Mindanao: 117.

In my opinion the measurements are too variable to constitute a recognizable form based on size, and I therefore prefer to synonymize *meridionalis* with *erythrogenys*.

PHASIANIDAE

Gallus gallus gallus Linné

Mindoro: Pasi, 1 ♀, 14 March; Bayog, 1 ♂, 1 ♀, 10 April and 3 May, 1937.

TURNICIDAE

Turnix suscitator fasciata (Temminck)

Mindoro: Subaan, 1 ♂, 2 ♀, 14 March, 1937.

RALLIDAE

Rallus philippensis philippensis Linné

Luzon: Lagangilang, near Bangued, 1 ♂ ?, 12 January, 1937.

This specimen is molting from immature to adult plumage and has acquired but faint traces of the chestnut nape, and only a few of the conspicuously black and white barred feathers on the underparts; the feathers of the hind neck and upper back are dusky with wide olivaceous edges and a few have small white spots on both webs. In the adult the corresponding plumage is black (or nearly so) with two to three white spots on the outer part of each web.

Rallus torquatus torquatus Linné

Mindoro: Paltabaan, 1 ♂, 15 April, 1937.

Amaurornis olivacea olivacea (Meyen)

Mindoro: Calawang, 1 ♂, 30 April, 1937.

Though recorded by McGregor on the authority of Bourns and Worcester as "a common bird snared in abundance by the natives," this species has not been taken previously by any one collecting in the Philippines for this museum.

Amaurornis phoenicurus javanica (Horsfield)

Mindoro: Pola, 1 ♀, 14 March; Casungo, 1 ♂, 1 May; Bayog, 1 ♀, 3 May; Anuling, 3 ♂, 6 May, 1937 (+ 1 no sex or locality, 9 March)
Basilan: 1 ♂, 15 km. northeast of Maluso.

Size variation in relation to geography in *Amaurornis phoenicurus* is such that the recognition of subspecies on this basis is largely a matter of preference. Stresemann (1913, pp. 303–305) assigns to *javanica* a range that includes Sumatra and adjacent small islands, Java, Bali, Kangean, Banka, Borneo, Natuna Islands, the Philippines, Sangir and Talaut Islands. He does not list the measurements of the birds by islands nor does he differentiate between the sexes, but the wing measurements of a large series examined by him range from 136–163 mm. with an average of 149.5. Birds from the greater part of southeastern Asia are referred to *chinensis;* Stresemann's wing measurement for a very large series from this area run between 144–187, average 163.1.

I have made wing measurements of small representative series with the following results:

Eastern China,	5 ♂, 164–174 [170];	5 ♀, 155–167 [159]
Philippines	6 ♂, 138–158 [148];	3 ♀, 142–152 [146.3]
Borneo		1 ♀, 128
Sumatra		1 ♀, 137
Nias	1 ♂, 143	
Java	4 ♂, 123–143 [134];	2 ♀, 129–134 [131.5].

Thus it is apparent that the Philippine birds occupy an intermediate position between the continental bird on the one hand and the bird of the Sunda Islands on the other, but near the smaller race. The difference at best is only average and certainly not worth naming.

Gallicrex cinerea (Gmelin)

Mindoro: Calawang, 1 ♂, 4 May, 1937.

Gallinula chloropus indica Blyth

Mindoro: Lake Naujan, 2 ♂, 1 ♀, 7 March, 1937.

These three specimens beyond a doubt represent the form of eastern Asia, some individuals of which may winter in the Philippines though no hint of any migatory movement in the Islands is given by McGregor or Hachisuka. La Touche (1932, pp. 284–285), however, tells us that this form is migratory in northern China. The three skins are in fresh unworn plumage with shrunken frontal shields; the back and wing coverts are strongly olive brown, just like the mainland form; the wings of both males measure 167 mm., that of the female 161. Ten birds from eastern China, five of either sex, especially measured at the

same time give for males 160, 163, 163, 169, 170; females 149, 152, 153, 156, 159.

The identity of the resident race of *G. chloropus* in the Philippines is as uncertain as when Hartert (1921, pp. 1840–1844) reviewed the species. At that time he showed that the characters on which Lletget relied for the separation of *lozanoi* are found in other races or dependent on season or age. I am unable to distinguish resident gallinules from Mindanao and Mindoro from Javan (topotypical) examples of *orientalis;* in the latter race the olive brown area is confined to the back, the wing coverts being slaty like the rest of the body plumage. My series of Javan birds affords the following wing measurements, males 143, 150, 151; females 141, 145, 149, 150. Two males from Mindoro give 157, 157, Mindanao male 152, female 151. Not sexed 148, 150. Two males and a female from Luzon (topotypical *lozanoi*) have an olive wash on the wing coverts, thus appearing intermediate between *orientalis* and *indicus;* their size also is intermediate, males 143, 155; female 153.

Naturally small series cannot be expected to give satisfactory results, so my conclusions, which can be regarded as only tentative, are as follows: that the resident birds of Mindoro and Mindanao should be called *G. ch. orientalis* Horsfield while breeding birds from Luzon may be called *G. ch. lozanoi* Lletget. I cannot help feeling that adequate series would show the resident bird of the entire Philippine Archipelago to prove inseparable from *orientalis*.

Porphyrio pulverulentus Temminck

Mindoro: Pasi, 1 ♂, 15 March, 1937.

JACANIDAE

Hydrophasianus chirurgus (Scopoli)

Mindoro: 1 ♂, 15 March, 1937.

CHARADRIIDAE

Charadrius dubius dubius (Scopoli)

Luzon: near Bangued, 1 ♀, 25 January, 1937.

This bird has wing of 107.3 and culmen of 14 mm.

SCOLOPACIDAE

Actitis hypoleucos (Linné)

Mindoro: Casungo, 1 ♀, 1 May, 1937.

Capella megala (Swinhoe)

Mindoro: Pasi, 1 ♀, 13 March, 1937.

COLUMBIDAE

Treron curvirostra erimacra Oberholser

Mindoro: Ariaod, 1 ♂, 17 May, 1937.

The Philippine race of this fruit pigeon is very distinct, being readily distinguishable from its geographically nearest relative, *T. c. nasica* Schlegel of Borneo. Compared with two males from Borneo whose wings measure 125 and 126 mm., this Mindoro bird has a wing of 136, and in addition to its larger size the underparts are a much brighter yellowish green. From *T. c. nipalensis* (Hodgson) it differs chiefly in having the back and scapulars a much deeper maroon shade. *T. c. curvirostra* (Gmelin) of the Malay Peninsula and Sumatra and *T. c. nasica* are very close; in fact I am unable to discover any constant characters by which the two can be distinguished. Perhaps in larger series than are available to me some differences may be apparent, so Schlegel's name for the Bornean bird may be allowed to stand.[1]

In view of the rather wide distribution of *Treron curvirostra* it is difficult to explain the limited distribution of *erimacra* in the Philippines where it is known only from Palawan, Balabac and Mindoro.

Treron pompadora axillaris (Bonaparte)

Mindoro: Merit, 1 ♂, 6 March; Pasi, 2 ♂, 2 ♀, 5–11 March; Subaan, 1 ♂, 12 March; Amuling, 1 ♀, 7 April; Carayrayan, 1 ♀, 13 April, 1937.
Basilan: 15 km. northeast of Maluso, 1 ♂, 19 April, 1937.

The Basilan specimen agrees with the series from Mindoro and shows no approach to the more yellow *everetti* of the Sulu Archipelago.

[1] Chasen (1935, p. 12) synonymizes *nasica* with *curvirostra*.

Treron vernans vernans (Linné)

Mindanao: Zamboanga, 1 ♂, 31 March, 1937.

There can be no doubt that *T. v. nesophasma* (Oberholser) from Mindanao is indistinguishable from *T. v. vernans*. Manuel (June 1936, p. 162) examined 24 ♂ and 15 ♀ from Bantayan, Basilan, Bohol, Bongao, Jintotolo, Luzon, Mindoro, Negros, Palawan, Siasi and Siquijor and could detect no differences between the birds from these various islands. His measurements (not differentiated as to sex or island) range, wing 145–154 (148.6); tail 92–104 (97.3); culmen 15–17 (15.9). Rivera's bird measures, wing 147.6; tail 100.5; culmen 16.4. It will be seen that the measurements of topotypical "*nesophasma*" are very close to the average of those of *T. v. vernans* from the rest of the Archipelago. The color characters claimed for *nesophasma* are paler throughout and green of upper parts averaging more grayish. These differences are not apparent when comparing the Mindanao bird with a series of 5 ♂ from Palawan.

Phapiteron leucotis leucotis (Temminck)

Mindoro: Mt. Halcon, 3 ♂, 1 ♀, 25–27 April; Subaan, 1 ♂, 12 March; Pasi, 1 ♂, 2 ♀, 4–10 March; Merit, 1 ♂, 1 ♀, 6 March; Bayog, 1 ♂, 10 April; Ariaod, 2 ♂, 1 ♀, 8 and 16 April; Anuling, 2 ♂, 2 ♀, 7 April; Calawang, 1 ♂, 6 April; Carayrayan, 1 ♂, 13 April; Paltabaan, 1 ♂, 1 ♀, 15 April, 1937.

This fine series shows the range of individual variation in this pigeon very well, since all the skins are in fine feather and the purple, green, blue and coppery iridescence show to excellent advantage. According to Manuel (Feb. 1936, pp. 291–292) Hachisuka's type of *mindorensis* is a particularly highly colored individual with more purplish iridescence on the back, tail and wing coverts.

Phapitreron leucotis brevirostris (Tweeddale)

Mindanao: near Zamboanga, 1 –, 2 April, 1937.

Phapitreron leucotis occipitalis (Salvadori)

Basilan: 15 km. northeast of Maluso, 2 ♂, 1 ♀, 19 and 21 April, 1937.

This form is easily distinguished from *brevirostris* of Mindanao by more extensive as well as more intense lilaceous iridescence on the nape and occiput, and the deeper brown throat.

PHAPITRERON AMETHYSTINA BRUNNEICEPS (Bourns and Worcester)

Basilan: 15 km. northeast of Maluso, 1 ♂, 1 ♀, 22 and 29 April, 1937.

These are topotypical examples of this race which is confined to Basilan. Lack of comparative material prevents a discussion of any of the seven or more races into which this pigeon is now subdivided.

LEUCOTRERON OCCIPITALIS OCCIPITALIS (G. R. Gray)

Mindoro: Pasi, 1 ♀, 5 March; Mt. Halcon, 1 ♂, 21 April, 1937.

Manuel (March, 1936, p. 331) believes that the bird originally described from Butuan, Mindanao from a young ♀ by Tweeddale and named *incognita*, is the same as the bird later described by Hachisuka from Mt. Apo, Mindanao, and that neither is distinct from the birds inhabiting Luzon, Mindoro, Negros, Cebu, Leyte, Samar and Basilan. Manuel's Mindanao material was from three lowland towns on this island—Agusan, Surigao and Davao and consisted of eight skins. These he was unable to separate from specimens from other islands in the Archipelago. While admitting the superiority of Manuel's material, I have available for comparison four topotypes of *brevipes*, and these differ from two Mindoro specimens in having deeper colored orange (Sienna) patches on the breast, smaller and darker red abdominal patch which is more widely bordered with green on the sides, and the posterior underparts more green, less gray; the tarsus is also shorter.

Under the circumstances I feel that it is best to recognize a highland race of this fruit pigeon from Mindanao under the name of *Leucotreron occipitalis brevipes* Hachisuka.

Measurements.

Mindoro	♂	wing 161	tarsus 27.7
	♀	150	28.8
Mindanao (Mt. Apo)	♂	148	26.6
	♂	152	25.8
	♂	151	26.6

LEUCOTRERON LECLANCHERI LECLANCHERI

Mindoro: near Calapan, 1 ♀, 15 March; Mt. Halcon, 1 ♀, 25 April, 1937.

There appear to be three recognizable races of this fruit pigeon whose names, characters and ranges are as follows:

L. l. longialis Manuel,—similar to the typical form but with longer wings and tail, males, wing, 160, 161; tail, 119, 121. Females, wing, 164; tail, 118. Batanes and Babuyanes groups of islands north of Luzon.

L. l. leclancheri (Bonaparte),—smaller than *longialis*, green of plumage not as deep as in *gironieri;* 2 males, Calagua Island, wing, 142, 150; tail, 106, 117; 2 females, Mindoro, wing, 143, 148; tail, 106, 105 (Manuel's measurements (Feb. 1936, p. 307), 14 specimens from Luzon, wing, 138–156; tail, 100–110). Philippines generally except the Batanes and Babuyanes Islands and islands of the Palawan group.

L. l. gironieri Verreaux and Des Murs, of about the same size as *l. leclancheri*, but top of head of male more grayish and sharply contrasted with the color of the back, green of body plumage deeper. Islands of Palawan, Busuanga and Culion. *L. l. palawana* Hachisuka is an absolute synonym.

Ducula aenea chalybura (Bonaparte)

Mindoro: Pasi, 3 ♂, 1 ♀, 5 March; Anuling, 1 ♂, 7 April; Bayog, 2 ♂, 2 ♀, 10 April; Mt. Halcon, 2 ♂, 1 ♀, 22–25 April; Ariaod, 3 ♂, 2 ♀, 8 April, 14–20 May, 1937.

A fine series of beautifully prepared clean skins which reflects credit on the skill of Mr. Francisco Rivera. These birds are not distinguishable from specimens from Luzon and Calagua. *D. ae. palawanensis* is much bluer above, but occasionally an odd skin of *chalybura* is almost as blue; such a bird was taken on Calagua Island 26 June, 1921 by Governor General Forbes and it must have been a bird of this style that induced Hachisuka to record both *palawanensis* and *chalybura* from Mindoro. All of Miss Lawrence's specimens, however, are quite typical of the latter race.

I have not seen birds from islands in the Babuyan group; these have been separated by Hachisuka on the basis of larger size, nor from Mindanao, whence Manuel has recently separated *D. ae. glaucocauda.*

Ducula carola carola (Bonaparte)

Mindoro: Mt. Halcon, 1 ♀, 29 April, 1937.

Columba vitensis griseogularis (Walden and Layard)

Mindoro: Mt. Halcon, 1 ♂, 24 April, 1937.

Macropygia phasianella tenuirostris Bonaparte

Luzon: near Bangued, 3 ♂, 1 ♀, 22 January.
Mindoro: Anuling, 1 ♂, 7 April; Carayrayan, 2 ♂, 2 ♀, 12 April; Paltabaan, 2 ♂, 1 ♀, 15 April; Ariaod, 3 ♂, 16 April, 15 and 16 May; Bayog, 1 ♂, 1 ♀, 2 May; Alsanagon, 2 ♂, 11 May.
Basilan: 15 km. northeast of Maluso, 2 ♂, 1 ♀, 19–22 April, 1937.

Streptopelia bitorquata dusumieri (Temminck)

Luzon: near Bangued, 1 ♀, 16 January.
Mindoro: Anuling, 1 ♂, 11 April; Carayrayan, 1 ♂, 12 April; Calawang, 1 ♂, 30 April; Ariaod, 1 ♂, 17 May, 1937.

Geopelia striata striata (Linné)

Luzon: near Bangued, 2 ♀, 13 and 14 January, 1937.

Philippine specimens of the Striated Ground-dove are quite indistinguishable from topotypical Javan examples both in color and in size. Five skins from Java have wing measurements between 92 and 99.5 mm.; six Philippine birds 93–98.5. The distribution of this species in the Philippines is peculiar, being found in only a few of the northern islands, particularly Luzon, absent from the Palawan group and from the rest of the Archipelago south of Mindoro. The assumption is that the bird reached the Philippines from the continent in comparatively recent time.

Chalcophaps indica indica (Linné)

Luzon: near Bangued, 3 ♂, 1 ♀, 15–27 January.
Mindoro: Calawang, 2 ♂, 1 ♀, 14–30 April; Ariaod, 1 ♂, 15 May.
Basilan: 15 km. northeast of Maluso, 3 ♀, 20–25 April, 1937.

I have compared our Philippine material with specimens from the Riu Kiu Islands,[1] Borneo, Sumatra, Java and Siam and cannot discover any geographic variation within this range. Available material from the mainland is very meagre, but what I have seen does not lead me to believe that it is possible to distinguish between the continental birds and the ones inhabiting the large islands to the southeastward. There

[1] Hachisuka has recently named (Bull. Brit. Orn. Cl., 59, 1939, p. 45) the Emerald Dove of the Riu Kiu Islands, calling it *C. i. yamashinai*, comparing it only with specimens from Formosa. The sole character given for distinguishing *yamashinai* is a wash of bluish slate over the vinaceous of the hind neck and upper back. This character, which is found only in the males, is a variable one in extent and amount. I have not examined Formosan examples, but note that the wash of bluish slate referred to is present in most examples examined by me from India, Siam, Indochina, Sumatra, Java, Borneo, the Philippines and the Riu Kiu Islands.

are several currently recognized races occupying relatively small islands on the periphery of the range of *C. indica; robinsoni* of Ceylon seems to me to be rather doubtful, as does *sangirensis* confined to Great Sangi Island; *maxima* of the Andamans and *minima* of the islands in Geelvink Bay are average size splits, neither very striking. Of course *chrysochlora* and *sandwichensis* are easily recognizable forms.

Gallicolumba platenae (Salvadori)

Mindoro: Bayog, 1 ♂, 2 May, 1937.

From the taxanomic standpoint it is rather difficult to decide just how the Philippine bleeding heart pigeons should be treated; there cannot be the slightest doubt that the birds are all representative forms, and their common ancestry is apparent in the red or orange spot of modified feathers in the center of the breast of each form, but the many differences in color and markings are a drawback to the use of trinomials.

PSITTACIDAE

Kakatoe haematuropygia (Müller)

Mindoro: Bayog, 1 ♀, 3 May; Calawang, 1 ♂, 14 May, 1937.

Hachisuka named the Polillo race *megregori* on the basis of larger size; he had but the type, a ♂, which had a wing of 225 and culmen of 29. His average measurements for birds from Bohol, Luzon and Mindanao (number not stated and sexes not differentiated) wing 213, culmen 27. The Polillo race requires confirmation based on adequate series, especially since an occasional large individual may occur in a given population.

Measurements of the series available to me follow:

Balabac	♀	wing 211	culmen 25
	♂	" 219	" 26.7
Mindoro	♂	" 213	" 24.1
	♀	" 219	" 25.4
	♀	" 206	" 24.5
Gigante Island (near Panay)	♀	" 210	" 25.1
Negros	♂	" 215	" 24.5
Palawan	♂	" 227	" 28.1
	—	" 210	" 25.2

Prioniturus discurus discurus (Vieillot)

Mindanao: 50 km. northeast of Zamboanga, 1 ♀, 4 April, 1937.

Prioniturus discurus mindorensis Steere

Mindoro: Pasi, 4 ♂, 2 ♀, 4–10 March; Calawang, 1 ♂, 5 ♀, 6 April; Anuling, 1 ♂, 1 ♀, 7 April; Bayog, 1 ♂, 1 ♀, 10 April, 2 May; Ariaod, 1 ♀, 16 May; Paltabaan, 1 ♂, 15 April, 1937.

Tanygnathus lucionensis lucionensis (Linné)

Mindoro: Calawang, 2 ♂, 6 and 9 April; Carayrayan, 1 ♂, 13 April; Ariaod, 2 ♂, 6 April and 9 May, 1937.

Three of the Mindoro birds are fully adult with well developed black shoulder patches and black centres to the median coverts, as well as blue crown and blue spots on the scapulars; the other two Mindoro birds are in immature plumage in which the black on the wings is absent and the blue confined chiefly to the lower back. The Basilan specimen is in a plumage midway between immature and adult. There is a good deal of size variation in birds from the same place and this, taken with the rather complex plumage changes makes the study of geographic variation in this species rather unsatisfactory unless very large series are available. Hachisuka has named three races, *paraguenus* from Palawan; *koikei* from Mindanao and *moro* from Jolo.

Wing measurements of the birds available to me are as follows: Mindoro, 6 ♂, 177, 182, 188, 192, 193, 197; Negros, 1 ♀, 177; Basilan, 2 ♂, 182, 185, 1 ♀, 178.

In the absence of topotypical Luzon material I have considered Mindoro birds as representing the typical form, since no one has ever endeavored to separate them; Negros and Basilan birds agree with them. It is surprising to find the Basilan bird the same as that found on Mindoro when the Mindanao bird is apparently different. *T. l. koikei* was described as smaller than the typical form with the upper parts much darker. The single Mindanao bird available is a rather poorly prepared immature bird without indication of sex, so the color characters cannot be confirmed, but the wing of 165 mm. is the same as that given for the type of *koikei;* the race therefore may be maintained. Two immature males from Jolo show the paler green originally given as the distinguishing character by Hachisuka for his *T. l. moro.* This race too may be maintained.

T. l. paraguenus was named on the basis of smaller size when com-

pared with the typical form, but I doubt if the race can stand. An adult and an immature ♂ before me measure 182 and 177 respectively, and thus fall within the lower brackets of measurements of true *lucionensis*.

Loriculus philippensis philippensis (P. L. S. Müller)

Luzon: near Bangued, 1 ♂, 14 January, 1 ♀, 29 January, 1937.

The ♂ is a cage bird.

Loriculus philippensis mindorensis Steere

Mindoro: Pola, 1 ♂, 2 March; Subaan, 1 ♂, 12 March; Calawang, 5 ♂, 2 ♀, 5–9 April; Bayog, 1 ♀, 10 April; Salibagon, 2 ♂, 17 April; Mt. Halcon, 4 ♂, 2 ♀, 19–25 April; Calagan, 1 ♂, 1 ♀, 6 May; Ariaod, 4 ♂, 7–9 May, 1937.

A fine series of this very distinct race which is confined to Mindoro.

CUCULIDAE

Surniculus lugubris velutinus (Sharpe)

Mindoro: Mt. Halcon, 1 ♂, 20 April, 1937.

An extremely large specimen with wing of 130 and tail of 121 mm.

Cuculus fugax pectoralis (Cabanis and Heine)

Hiracococcyx pectoralis Cabanis and Heine, Mus. Hein., Th. 4, 1862, Heft 1, p. 27 (Philippines).

Mindoro: Carayrayan, 1 adult ♀, 12 April, 1937.

When first identifying this specimen I availed myself of Stresemann's (1930, p. 306) brief review of *C. fugax* and found to my astonishment that the bird did not agree with the diagnosis of any of the three races with which he dealt. I then remembered vaguely that Dr. Mayr had told me he planned to name a new resident race of *C. fugax* from the Philippines and hence I wrote him for further details. He replied to the effect that *Hiracococcyx pectoralis* of Cabanis and Heine was available for this bird, and has since published (1938, p. 20–26) a fresh revision of the races of *Cuculus fugax* in which the characters of the Philippine bird are clearly pointed out.

The bird taken by Mr. Rivera appears to be fully adult; it measures, wing, 172, tail, 159, bill, 19.5, wing-tip, 44.

Cuculus optatus optatus Gould

Mindoro: Anuling, 1 ♂, 7 April, 1937.

This specimen, with all the primaries in the right wing missing, is almost certainly referable to the typical form of this species that breeds in Siberia, northern China and the Japanese islands. McGregor (1909, p. 372) recorded this species from Mindanao and Palawan under the name of *Cuculus saturatus* Hodgson. His wing measurements of 188 mm. induced Hachisuka to refer the identification to *C. o. kelungensis* Swinhoe, a race not recognized in 1909 but now known to be the smaller southern form breeding in southeastern China and on Formosa. It appears, however, that McGregor's records were based on specimens collected by Platen, and the description of the bird was quoted, McGregor apparently having no specimens at hand; consequently Hachisuka's supposition that *kelungensis* is the race of *C. optatus* occurring in the Philippines is unwarranted. Males of *C. o. optatus* that I have measured from the Altai, Kentei Mountains, northern China and Japan have wing lengths from 184 to 206 mm.; the corresponding sex of *kelungensis* from Formosa and Fokien varies between 180–182. The Mindoro specimen has a wing of 194.5 and is therefore referable to the larger northern form which of course is only a winter visitor to the Philippines.

Cacomantis variolosus everetti Hartert

Basilan: near Isabela, 1 not sexed, 11 May, 1937.

One of the surprises of Miss Lawrence's collection is a fine adult of this race. It agrees with Hartert's description in having the entire under surface chestnut to the base of the lower mandible. Hitherto *everetti* was known only from Tawi Tawi and Jolo. Hachisuka considers *merulinus* and *variolosus* to be conspecific, but the occurrence of forms of both on Basilan upsets his conclusions and shows that Hartert was correct (as he usually was) when he regarded *merulinus* and *variolosus* as specifically distinct. *C. v. everetti* is a larger bird than *C. m. merulinus;* the Basilan specimen has a wing of 113.5 mm. and tail of 132.7.

Cacomantis merulinus merulinus (Scopoli)

Basilan: 15 km. northeast of Maluso, 1 adult ♂, 1 sub-adult ♀, 2 imm. ♀, 22–29 April, 1937.

These specimens have the following measurements:

	wing	tail
♂	100	105.5
♀	102.2	108.7
♀	99.3	103
♀	99.8	102.7

Chalcites xanthorhynchus amethystinus (Vigors)

Basilan: near Isabela, 1 ♂, 9 May, 1937.

This specimen is in fine fresh plumage. Compared with a ♂ of the typical form from Cachar, the rare Philippine bird is smaller with a wing of 93.5 mm. (against 101.8) and the gloss much deeper with a strong bluish tinge, less purely violaceous.

Eudynamys scolopacea mindanensis (Linné)

Mindoro: Subaan, 1 ♂, 12 March; Calawang, 1 ♀, 6 April; Paltabaan, 1 ♂, 15 April; Mt. Halcon, 2 ♂, 18 and 23 April, 1937.

Hachisuka has named the koel from Mindoro *E. s. onikakko;* the male of this proposed form is described as having the entire plumage glossy blue-black, but so do the males of the other races of *E. scolopacea!* The female is described as differing from *mindorensis* in having very little rufous tinge, the throat and breast being practically black and white. The Mindoro female before me is strongly rufescent. Hachisuka's proposed race appears to be based on variable characters and its recognition is not justified.

Centropus steerei Bourns and Worcester

Mindoro: Pasi, 1 ♀, 10 March; Mt. Halcon, 1 ♂, 1 ♀, 22 April, 1937.

Very little idea of the distinctness of this species from *mindorensis,* with which it occurs, can be gained from reading McGregor's description in the Manual of Philippine birds. While the two are about the same size, *steerei* is a much stockier and more heavily built bird; the bill is much longer, thicker and more strongly decurved; the body color can hardly be called "smoky brown glossed with green;" rather it is bronzy with a strong greenish gloss. While the plumage of the head and neck is that of a typical Centropus, harsh with coarse shiny shafts, the rest of the body plumage both above and below is comparatively soft. The hind claw is quite unlike that of *mindorensis,*

rather stout for a Centropus and not exceeding the hallux in length (instead of being slender and twice the length of the hallux).

Centropus melanops melanops Lesson

Basilan: 15 km. northeast of Maluso, 1 ♀, 1 May, 1937.

The species *melanops* is confined to the more southern islands of the Philippines, recorded from Samar, Leyte, Bohol, Mindanao, Basilan and Nipa. The birds from the first named island have been described as *C. m. banken* Hachisuka.

Stresemann (1939, p. 63–63) considers both *melanops* and *steeri* to be related to *C. sinensis;* in this he would appear to be entirely correct.

Centropus viridis viridis (Scopoli)

Luzon: near Bangued, 2 ♀, 21 and 26 January.
Mindanao: Zamboanga, 1 ♂, 30 March.
Basilan: 15 km. northeast of Maluso, 1 ♂, 1 imm. ♂, 18 and 25 April, 1937.

I can find no mention of either a seasonal or sexual difference in plumage in this Cuckoo, but unless the two females from Luzon represent an entirely new species, which is most doubtful, it has a plumage change like that of *Centropus toulou* of Madagascar. The wings and tail are precisely like those of a female taken on Samar, 22 June, 1921, but top and sides of head and upper back are brown with pale shaft streaks; the underparts are pale buffy brown narrowly barred with dusky and with pale shaft streaks; there are pale shafts on some of the upper wing coverts and the under wing lining is marked like the underparts. A few black feathers of the breeding plumage are apparent on the nape of each specimen and one has a distinct greenish gloss on the interscapulars.

Centropus viridis mindorensis (Steere)

Mindoro: Pasi, 1 ♂, 1 ♀, 5 and 11 March; Merit, 1 ♂, 6 March; Antipolo, 1 ♂, 11 March; Calawang, 1 ♂, 1 ♀, 9 April and 4 May; Mt. Halcon, 1 ♂, 1 ♀, 20 and 22 April; Ariaod, 1 ♂, 1 ♀, 8 and 14 May; Alsanagon, 1 ♂, 11 May, 1937.

The males are distinctly smaller than the females; the wings of seven of the former sex vary between 146.5 and 159 (average 150.4) and of four females 166.5–174 (average 169.1).

Stresemann (1939, p. 63–64) has shown that *mindorensis* is an allelomorph of *viridis*. The problem is the taxonomic treatment of a genetic case of this sort. If birds of the *mindorensis* type occurred together with *viridis* on Mindoro then it would be incorrect to distinguish them racially. On the other hand it appears that these wholly black allelomorphs occur only on Mindoro and Batan (*C. carpenteri*). On the latter island *viridis* is unrecorded and on the former the single record for *viridis* collected by B. Schmacher in 1890 (Hartert, 1891 A p. 253) is doubted by Hartert in a later publication (1891 B p. 298). Under the circumstances it is convenient to call this apparently homozygous population *C. viridis mindorensis*.

Centropus bengalensis javanensis (Dumont)

Mindoro: Anuling, 1 ♂, 7 April; Carayrayan, 1 ♂, 13 April; Calawang, 2 ♂, 1 ♀, 30 April, 4 May, 1937.

TYTONIDAE

Tyto longimembris amauronota (Cabanis)

Luzon: near Bangued, 1 ♀, 27 January, 1937.

I use this subspecific name as one of certain application, since Luzon is the type locality, but knowledge of *Tyto longimembris* is so fragmentary that not even Hartert (1929, pp. 102–104) was able to revise the species satisfactorily.

STRIGIDAE

Ninox spilocephala mindorensis

Mindoro: Anuling, 1 ♂, 7 April; Mt. Halcon, 1 ♂, 21 April, 1937.

CAPRIMULGIDAE

Eurostopodus macrotis macrotis (Vigors)

Mindoro: Pasi, 1 ♂, 4 March; Calawang, 1 ♂, 6 April, 1937.

In Proc. Zool. Soc. London, 1878, p. 945, Tweeddale described *Lyncornis mindanensis* from Mindanao as having the crown, nape, forehead and eartufts, dark grayish brown and not rufous, browns of the plumage much darker and wings shorter. In Cat. of Birds, British Mus., **16**, 1892, p. 605, Hartert recognized Tweeddale's bird; he had

eight specimens of *macrotis* including the type from Manila and three examples of *mindanensis*, the topotypes of that form. However, Grant (1894, p. 519) in reporting on the birds collected in northern Luzon by John Whitehead, found that specimens referable to *mindanensis* occurred with *macrotis* in northern Luzon, and under these circumstances considered the latter to represent younger examples. McGregor followed Grant's reasoning by synonymizing *mindanensis* with *macrotis*, but Hachisuka resurrected it, entirely ignoring Grant's remarks or McGregor's action.

The measurements of specimens, compiled in part from literature, give the following result:

		Wing	Tail	
Luzon	1 ♀	290	180	(McGregor)
	—	266–282	163	(Hartert)
Mindoro:	1 ♂	275	170	(McGregor)
	1 ♂	267	180	(specimens in M.C.Z.)
	1 ♀	263	175	(specimens in M.C.Z.)
Mindanao:	—	248–267	162–177	(Hachisuka)
		260–262	163	(Hartert)
Basilan:	1 ♂	276	223	(Bourns and Worcester)

These show that the Mindanao bird does average smaller than birds from Luzon and Mindoro, but that there is a great individual size range; the tail of the Basilan bird is so very long that I cannot help suspecting an error in measurement. Color is quite unreliable, especially whether the crown is rufescent or brownish gray. My belief is that *mindanensis* should remain as a synonym of *macrotis* until more representative series of measurements actually show it to be distinct.

Mayr (1937, p. 7) suggests that Lyncornis Gould, April 1838, be united with Eurostopodus Gould, April 1838, and that if the former genus is to be recognized at all it should be restricted to the group which includes *cerviniceps*, *macropterus* and *macrotis*. This group, the members of which are conspecific, is merely the culmination of a small number of species of Australasian Caprimulginae. The *macrotis* Formenkreis is the most specialized of these and has developed a pair of parietal tufts, indications of which are present in other species, *temminckii* for instance. I think it is best to "go the whole hog and sink" Lyncornis entirely.

HEMIPROCNIDAE

Hemiprocne comata major Hartert

Luzon: Abra Province, 50 km. east of Bangued, 1 ♂, 1 ♀, 3 February, 1937.

Hemiprocne comata barbarae subspec. nov.

Type. M.C.Z. no. 194255, ad. ♂, collected at Bayog, Naujan, Mindoro, Philippine Islands, 2 May, 1937, by Francisco S. Rivera (original no. 294).

Subspecific characters. Similar to *H. c. major* Hartert and of about the same size, but back and breast strongly glossed with greenish, instead of being clear bronze brown without greenish wash. Wing measurements of four specimens from Mindoro are as follows:

3 ♂,	133	137.5 (type)	132
1 ♀,	137		

Hemiprocne comata nakamurai Hachisuka

Basilan: 15 km. northeast of Maluso, 1 ♂, 19 April, 1937.

This race, the type locality of which is Samal Island off Davao, Mindanao, was separated on the basis of greener back and underparts and size intermediate between *major* and typical *comata*.

2 ♂	Mindanao	w. 123, 127
1 ♂	Basilan	w. 124

The races of *Hemiprocne comata* and their characters and ranges are:

a Back and underparts (except chin and throat) bronze brown

b Size smaller, wing under 130 — *comata* — Malay Penin., Sumatra, Borneo, Anamba Islands, Natuna Islands

bb Size larger, wing over 130 — *major* — Luzon

aa Back and underparts (except chin and throat) with greenish gloss

b Size larger, wing over 130 — *barbarae* — Mindoro

bb Size smaller, wing under 130

c Abdomen more extensively white and auricular patch of ♂ deeper chestnut — *nakamurai* — Mindanao, Basilan

cc Abdomen less extensively white and auricular patch of ♂ paler chestnut — *stresemanni* — Mentawi Islands.

APODIDAE

Collocalia troglodytes Gray

Luzon: Abra Province, San Juan, near Bangued, 3 ♂, 2 ♀, 29 and 30 January; Bucay, 1 ♀, 13 January, 1937.

This distinct species is confined to the Philippines where it has been recorded from most of the principal islands including Palawan; it is not known to occur, however, on any of the islands lying southwestward of Basilan Strait.

Collocalia marginata Salvadori

Cebu: Mactan Island, Opon, 1 ♂, 3 ♀, 21 May, 1937.

In using the above name I do so chiefly on the grounds of certainty of application, not with any intention of entering into a discussion as to whether or not the bird is conspecific with *esculenta* or whether there is any such bird as *isonota*. My material is not sufficient to permit such a discussion. Oberholser (1906, p. 203) regarded *marginata* as a distinct species and named *isonota* as a race of *linchi* [*linchi* is currently considered a race of *esculenta*]. Stresemann (1925) regarded *marginata* as a race of *esculenta* and *isonota* as a synonym of *marginata*. Hachisuka calls *marginata* a distinct species and *isonota* a race of *esculenta*, thus reverting to Oberholser's treatment.

The correctness of either view depends on whether the white edgings of the upper tail coverts are of taxonomic value or represent a phase or an age character. I am rather inclined to believe that the former is the case, for there seems to be an average size difference between birds of the *marginata* type and birds of the *isonota* type of marking, at least in the male sex. Wing measurements of the available material follow:

"*isonota*"	Luzon	♂	97.2,	103.5,	104.5
		♀	98	100.3	
"*marginata*"	Palawan	♂	91.5		
		♀	98.5		
	Mactan Island	♂	93		
		♀	99, 99, 100		

Collocalia fuciphaga amelis Oberholser

Marinduque: near Santa Cruz, 1 ♂, 11 March.
Mindanao: Curuan, 50 km. northeast of Zamboanga, 1 ♂, 1 ♀, 4 April.
Cebu: Minganilla Caves, 1 ♀, 23 May, 1937.

Neither Stresemann nor Mayr (1937), the two most recent revisers of Collocalia, has any more than indicated the relationships of the various Philippine Collocalias, all of which were originally described as "species." The four specimens that I identify as *amelis* can, I think, be safely placed in the *fuciphaga* Formenkreis; they have naked tarsi,

rather strong decurved bills, unicolorous backs, wings ranging from 113.7–121.8 and tails forked to a depth of 6.4 to 7.5. It is hardly possible to include them in the *germani* group as Mayr suggests.

Collocalia (vestita?) mearnsi Oberholser

Luzon: near Baguio, Mt. Santo Tomas, 1 ♂, 8 January.
Mindoro: Carayrayan, 1 ♂, 13 April, 1937.

These two specimens with partly feathered tarsi and very small weak bills are certainly *mearnsi* whatever that may be. Stresemann was first inclined (1925, p. 184) to consider it a race of *francica;* later (1931) he regarded it as a synonym of the Sumatran *vestita;* Hachisuka likewise synonymizes *mearnsi* with *vestita.* Mayr provisionally calls birds of this type from the Philippines, Borneo and Maratua Island "*mearnsi*" in default of topotypical *vestita.*

In view of the well known tendency of Collocalias to subdivide geographically one would hardly expect *vestita* to occur unchanged in the Philippines.

TROGONIDAE

Harpactes ardens (Temminck)

Basilan: 15 km. northeast of Maluso, 1 ♀, 29 April; near Isabela, 1 ♀, 4 May, 1937.

ALCEDINIDAE

Rhamphalcyon capensis gouldi (Sharpe)

Mindoro: Lake Naujan, 1 ♀, 7 March; Ariaod, 1 ♀, 17 May, 1937.

Ceyx melanura mindanensis Steere

Basilan: 15 km. northeast of Maluso, 1 ♀, 29 April, 1937.

In the absence of topotypical *mindanensis* I can form no independent opinion as to the validity of *Ceyx basilanica* Steere, but follow Bourns and Worcester and subsequent authors in relegating the latter name to the synonymy of the former.

Ceyx rufidorsus Strickland

Mindoro: Mt. Halcon, 1 ♀, 20 April, 1937.

Ceyx lepidus margarethae Blasius

Basilan: 15 km. northeast of Maluso, 1 ♂, 25 April, 1937.

This kingfisher is usually described as having the loreal spot and underparts orange-rufous, edge of wing and outer web of first alula quill and first primary, rufous. In the single specimen before me the lores are white, faintly washed with yellowish, bend of wing and outer web of first alula quill and a thin edge on the outer web of the first primary, white; the underparts are washed with pale ochraceous, palest on the throat and darkest on the abdomen.

The plumage variation in this bird is in part responsible for its lengthy synonymy. It was first named from Mindanao by Blasius in the Braunschweigische Anzeiger in April 1890; Steere in June 1890 named *bournsii* and *malamaui* from Basilan and in 1905 Grant named *goodfellowi* from Mindanao; this last form is tentatively recognized by McGregor and Hachisuka, but it seems best that it should go into the synonymy of *margarethae* also, in view of the plumage variation shown by this race.

Halcyon gularis (Kuhl)

Luzon: Abra Province, near Bangued, 2 ♂, 1 ♀, 14–22 January.
Mindoro: Pasi, 2 ♀, 7 March; Merit, 1 ♂, 6 March; Ariaod, 2 ♂, 1 ♀, 8 April; Calawang, 2 ♂, 1 ♀, 6–30 April.
Mindanao: Pasonanea River, near Zamboanga, 1 ♂, 2 April, 1937.

Halcyon chloris collaris (Scopoli)

Mindoro: Subaan, 1 ♀, 12 March; Ariaod, 1 ♂, 1 ♀, 8 April; Calawang, 3 ♂, 1 ♀, 5–9 April; Binugsucan, 1 ♀, 5 May, 1937.
Basilan: 15 km. northeast of Maluso, 1 ♂, 2 ♀, 20 April–1 May; near Isabela 2 ♂, 5 and 6 May, 1937.

Halcyon winchelli winchelli Sharpe

Basilan: near Isabela, 1 ♂, 5 May, 1937.

This specimen is topotypical and must belong to the nominate form. Hachisuka has named *H. w. nigorum* from Negros, apparently from a single specimen, using characters that will hardly stand up in a series. The species is peculiar to the Philippines where it occupies the principal islands in the southern half of the Archipelago; Romblon is the northernmost on which it occurs.

Halcyon lindsayi lindsayi (Vigors)

Luzon: Abra Province near Bangued, 1 ♂, 13 January, 1937.

Halcyon lindsayi is confined to the Philippines where it is apparently rare; the typical race occurs on Luzon and is replaced by another subspecies, *moseleyi*, on Negros. The species is unknown on any of the other islands.

MEROPIDAE

Merops viridis americanus P. L. S. Müller

Mindoro: Anuling, 1 ♀, 11 April; Binugsucan, 3 ♂, 1 ♀, 5 May; Ariaod, 1 ♂, 1 ♀, 9 May, 1937.

CORACIIDAE

Eurystomus orientalis orientalis (Linné)

Mindoro: Merit, 1 ♂, 1 ♀, 6 March; Antipolo, 1 ♂, 11 March; Anuling, 1 ♂, 7 April; Carayrayan, 1 ♂, 13 April; Salibagon, 1 ♂, 17 April; Bayog, 1 ♂, 2 May; Ariaod, 1 ♂, 9 May, 1937.
Basilan: 15 km. northeast of Maluso, 1 ♂, 1 ♀, 21–22 April, 1937.

BUCEROTIDAE

Penelopides panini manillae (Boddaert)

Luzon: near Bangued, 1 ♀, 30 January, 1937.

In 1903 Finsch named *P. talisi* from Cagayan, Luzon, believing it to differ from *manillae* in having no pale edges to the primaries and in having the rusty tail band much reduced. McGregor tentatively recognized *talisi*, but Hachisuka considers it a synonym of *manillae* and indicates that the character of the tail band varies individually.

Penelopides panini mindorensis Steere

Mindoro: Pasi, 2 ♀, 9 March; Calawang, 1 ♂, 9 April; Mt. Halcon, 5 ♂, 3 ♀, 19–25 April, 1937.

Prior to the publication of Meyer and Wiglesworth Birds of Celebes in 1898 the genus Penelopides included *Buceros exarhatus* Temminck of Celebes, as well as the members of the *panini* group from the Philippines; Meyer and Wiglesworth created the monotypic genus Rhab-

dotorrhinus for the Celebes species, and their genus has been universally accepted until very recently when Stresemann (1936, p. 362) reunited the forms in Penelopides. Of course it is difficult in dealing with hornbills to judge to what extent the form of the casque is to be given generic value and to what extent it is merely specific, but in this case I should prefer to keep Rhabdotorrhinus for the Celebes bird and restrict Penelopides to the *panini* group of the Philippines.

P. p. mindorensis is the only race of *panini* in which the ♀ resembles the ♂ in color; all the other forms, of which ten are currently recognized, show a sexual color dimorphism.

Penelopides panini basilanica Steere

Basilan: near Isabela, 1 ♂, 9 May, 1937.

CAPITONIDAE

Xantholaema haemacephala haemacephala (P. L. S. Müller)

Luzon: Abra Province, near Bangued, 1 ♂, 2 ♀, 20–28 January.
Mindoro: Pasi, 1 ♂, 5 March; Merit, 1 ♀, 6 March; Subaan, 1 ♀, 12 March; Bayog, 1 ♂, 2 May, 1937.

The distribution of this form is rather peculiar; it is recorded only from Luzon, Mindoro, Samar, Leyte, and Mindanao, and questionably from Calamianes. On Tablas, Romblon, Masbate, Guimaras, Negros and Cebu it is represented by a bird in which the yellow throat and ocular spots of *haemacephala* are replaced by red. This last form is usually considered to be conspecific with *Xantholaema rosea* of Java and Bali, but it seems much more logical to treat all the red-throated members as races of the yellow throated *haemacephala* as has already been suggested by Bartels and Stresemann (1929, p. 118) and concurred in by Chasen (1935, p. 140).

It is noteworthy that no member of the *haemacephala-rosea* Formenkreis has been recorded from Borneo nor any of the other Philippine Islands except those listed; thus it is absent from some of the larger and more important islands such as Palawan, Panay, Bohol, Basilan and the entire Sulu Archipelago.

PICIDAE

Chrysocolaptes lucidus maculiceps Sharpe

Basilan: 2 ♂, 3 ♀, 15 km. northeast of Maluso, 16 April–1 May, 1937.

This bird was described from Basilan by Sharpe in Trans. Linn. Soc. London, **30**, 1877, p. 314, 350 pl. 46, f. 2, but was placed in the synonymy of *C. l. lucidus*, the Mindanao race, by Hargitt in vol. 18, Cat. Birds Brit. Mus., 1890, p. 455–456, where it remained until resurrected by Hachisuka in Bds. Phil. Ids., **2**, 1934. Hachisuka, however, compares it with *C. l. haematribon* of Luzon instead of with its nearest relative *C. l. lucidus*, so it is not possible to tell just how the two differ. In default of material of the latter race I use Sharpe's name of certain application without vouching for the validity of *maculiceps*.

Dryocopus javensis mindorensis (Steere)

Mindoro: Mt. Halcon, 1 ♂, 2 April; Calawang, 1 ♀, 6 April; Carayrayan, 2 ♂, 12 April, 1937.

There seem to be no characters of generic value that would justify the maintenance of the genus Thriponax for *Picus javensis*.

Dryocopus javensis multilunatus (McGregor)

Basilan: 15 km. northeast of Maluso, 1 ♂, 1 ♀, 26–28 April, 1937.

In McGregor's Man. Phil. Birds, pt. 1, 1909, p. 405, this form falls into that section of the key to the genus Thriponax in which the breast is black without light edges to the feathers and rump with a white band; as a matter of fact McGregor in the original description laid special stress on the pale buffy edges of the breast feathers and made no mention of a white rump. In the pair collected by Miss Lawrence the edgings to the breast feathers are neither numerous nor conspicuous, and the rump is without trace of white. It is clear that this key is misleading.

Dryobates moluccensis validirostris (Blyth)

Mindoro: Pasi, 1 ♂, 5 March; Subaan, 1 ♂, 12 March; Carayrayan, 1 ♀, 12 April; Mt. Halcon, 3 ♂, 1 ♀, 20–25 April, 1937.

Perhaps the Mindoro race of *Dryobates moluccensis* may prove separable from the topotypical Luzon bird, but I have not sufficient seasonably comparable material from the latter island to decide this point.

Dryobates moluccensis fulvifasciatus (Hargitt)

Basilan: 15 km. northeast of Maluso, 1 ♂, 2 May, 1937.

EURYLAIMIDAE

Sarcophanops steerii Sharpe

Basilan: 15 km. northeast of Maluso, 3 ♀, 19 April–1 May, 1937.

This interesting species is known only from Dinagat, Mindanao and Basilan.

I have not seen *Sarcophanops samarensis* Steere which is confined to the islands of Samar and Leyte, but the description leads to the conclusion that the differences between it and *steerii* are only those of degree and that trinomials would better express the relationships between the two.

PITTIDAE

Pitta erythrogastra erythrogastra Temminck

Mindoro: Subaan, 1 ♂, 12 March; Bayog, 2 ♀, 10 April and 2 May, 1937.

HIRUNDINIDAE

Hirundo rustica gutturalis Scopoli

Mindoro: Pasi, 1 ♂, 11 March, 1937.

Hirundo tahitica abbotti Oberholser

Mindoro: Salibagon, 1 ♀, 17 April, 1937.

CAMPEPHAGIDAE

Coracina striata mindorensis (Steere)

Mindoro: Pasi, 1 ♂, 1 ♀, 4 March; Merit, 1 ♀, 6 March; Ariaod, 1 ♂, 1 ♀, 8 April; Mt. Halcon, 2 ♂, 3 ♀, 22–29 April, 1937.

I can see no reason for maintaining both Artamides and Coracina as distinct genera. Coracina Vieillot is of course not preoccupied by Coracinus Pallas; hence Graucalus Cuvier becomes an objective synonym of Coracina, both having the same type.

Edolisoma morio elusum McGregor

Mindoro: Mt. Halcon, 2 ♂, 1 ♀, 19–28 April, 1937.

EDOLISOMA MORIO MINDANENSE (Tweeddale)

Basilan; 15 km. northeast of Maluso, 1 ♂, 15 April, 1937.

LALAGE MELANOLEUCA MELANOLEUCA (Blyth)

Mindoro: Bayog, 1 ♀, 10 April; Mt. Halcon, 3 ♂, 1 ♀, 19–28 April, 1937.

LALAGE NIGRA CHILENSIS (Meyen)

Luzon: near Bangued, 2 ♂, 1 ♀, 17–25 January.
Mindoro: Binugsucan, 1 ♀, 5 May.
Mindanao: Zamboanga, 1 ♀, 30 March, 1937.

Until 1922 the common Philippine Lalage was considered to be the same as the bird found in southeastern Asia and the Sunda Islands, but in that year Bangs differentiated the Philippine bird by reason of its larger size under the name of *Lalage nigra mirifica*. Three years before, however, Neumann had named a bird supposed to have been taken on Culion as *Lalage schisticeps*, and this name was adopted by Hachisuka in 1935 as the subspecific name of the Philippine race of *Lalage nigra*. However, Stresemann had already pointed out (Orn. Monatsb., **30**, 1922, p. 88 and *Id.*, **38**, 1930, p. 19) that the type of *schisticeps* was an artefact, made up of the body of *Lalage nigra* and the head of *Pericrocotus divaricatus* and in Orn. Monatsb., **38**, 1930, p. 19, published a note to the effect that the type of *Ceblepyris chilensis* Meyen, 1834, was in the Berlin Museum; that it did not come from Chile as Meyen supposed but came from Manila, Luzon, and was the same as the bird later named by Bangs. But if there was no prior name, Bangs' name *mirifica* would hold over Neumann's *schisticeps* since the latter is based on an artefact.

DICRURIDAE

DICRURUS BALICASSIUS BALICASSIUS (Linné)

Mindoro: Pasi, 3 ♂, 4–11 March; Anuling, 3 ♂, 7–11 April; Ariaod, 1 ♀, 8 April; Bayog, 1 ♀, 10 April; Mt. Halcon, 4 ♂, 1 ♀, 19–28 April, 1937.

I use the trinomial for these birds since it appears that *balicassius* is conspecific with *annectans*. It might be proper to identify these specimens as *D. balicassius mindorensis* Mearns, but this race has been synonymized with the typical form by McGregor and I have only Mindoro birds available and no topotypical skins from Luzon for comparison.

Dicrurus hottentottus striatus Tweeddale

Basilan: 15 km. northeast of Maluso, 1 ♂, 1 ♀, 20 and 27 April, 1937.

ORIOLIDAE

Oriolus chinensis chinensis Linné

Luzon: near Bangued, 2 ♂, 1 ♀, 21–25 January.
Mindoro: Pasi, 1 ♂, 2 ♀, 4–8 March; Calawang, 2 ♂, 3 ♀, 7–30 April; Ariaod, 1 ♂, 16 April; Casungo, 2 ♀, 1 May; Alsanagon, 1 ♂, 11 May.
Basilan: 15 km. northeast of Maluso, 1 ♀, 17 April, 1937.

This is the *Oriolus acrorhynchus* Vigors of McGregor's "Manual." Meinertzhagen, however, has shown (1923, p. 72) that *Oriolus cochinensis* of Brisson, **2**, p. 326, pl. 33, fig. 1, the exclusive basis of Linné's *Oriolus chinensis*, agrees more nearly with this form than with any other of the group, and adopts it, substituting Manila as the type locality in place of China, erroneously given by Linné.

Oriolus xanthonotus basilanicus Ogilvie-Grant

Basilan: 15 km. northeast of Maluso, 2 ♀, 17 and 26 April; Isabela, 1 ♂, 6 May, 1937.

The distribution of *O. xanthonotus* in the Philippines is peculiar; *O. x. consobrinus* Wardl.-Rams. extends from Borneo to the Palawan group; the species is absent from Luzon, Mindoro and the lesser adjacent islands but recurs in the southern half of the Archipelago with *O. x. samarensis* Steere on Samar and Leyte, *O. x. steeri* Sharpe, Masbate and Negros, *O. x. basilanicus* Og. Gr., Mindanao and Basilan, *O. x. cinereogenys* Bourns and Worcester on Bongao and Tawi Tawi in the Sulas and *O. x. assimilis* Tweeddale is found on Cebu.

CORVIDAE

Corvus coronoides philippinus Bonaparte

Mindoro: Pasi, 1 ♂, 5 March; Ariaod, 1 ♂, 8 April; Casungo, 1 ♀, 1 May, 1937.

Corvus enca pusillus Tweeddale

Mindoro: Pasi, 2 ♀, 10 and 11 March; Subaan, 1 ♂, 1 ♀, 12 March; Bayog, 2 ♀, 10 April; Calawang, 1 ♂, 1 ♀, 4 May; Ariaod, 1 ♀, 7 May; Alsanagon, 1 ♂, 11 May, 1937.

PARIDAE

Parus elegans montigenus (Hachisuka)

Luzon: Baguio, 1 ♂, 1 ♀, 8 and 9 January, 1937.

This race of the Elegant Titmouse was described by Hachisuka in Suppl. Publ. No. 14, Orn. Soc. Japan, 1930, p. 200, with type from Haight's Place, 2469 metres, 56 km. from Baguio, Mountain Province, Luzon. According to Hachisuka, this is a mountain form, true *elegans* being confined to the lowlands of Luzon and presumably the lowlands of some of the other islands. According to its describer *montigenus* is supposed to differ from the typical form in having smaller white spots on the back and wing coverts and "underpart of the body yellow less bright sulphery shine." Miss Lawrence's birds agree with three adults from Baguio collected by W. C. Forbes and all differ from a single old specimen purporting to come from Manila in just the characters pointed out by Hachisuka.

I have examined Lafresnaye's type of *Parus quadrivittatus* and while that name certainly does not apply to Hachisuka's new race, the type should be compared with some of the other Philippine races of *Parus elegans* (nine are enumerated by Hachisuka), not one of which has ever been compared with the type of *Parus quadrivittatus*.

SITTIDAE

Callisitta frontalis mesoleuca (Ogilvie-Grant)

Luzon: near Baguio, 1 ♂, 1 ♀, 6 and 8 January, 1937.

Callisitta frontalis lilacea (Whitehead)

Basilan: near Isabela, 1 ♂, 6 May, 1937.

CERTHIIDAE

Rhabdornis mystacalis minor Ogilvie-Grant

Basilan: 15 km. northeast of Maluso, 1 ♂, 1 ♀, 18 and 20 April, 1937.

TIMELIIDAE

Minodoria striaticeps striaticeps (Sharpe)

Basilan: 15 km. northeast of Maluso, 2 ♂, 2 and 3 May, 1937.

Hachisuka erected the genus Minodoria for *Macronus striaticeps*, leaving Macronus for *Macronus ptilosus* of the Malay Peninsula, Sumatra and Borneo. In so doing he appears to be entirely correct; no doubt the two genera are related as evidenced by the remarkable modification of the interscapulars in both species, but Macronus not only shows this modification to a greater degree, but possesses a similar tuft of feathers arising from each side of the breast; in addition the plumage is more decomposed and the lores are nearly naked.

Zosterornis whiteheadi Ogilvie-Grant

Luzon: Kalinga Province, Balbalasang, 35 km. west of Lubuagan, 2 ♂, 6 February; Mountain Province, Mt. Santo Tomas, 1 ♂, 14 February, 1937.

PYCNONOTIDAE

Irena cyanogastra melanochlamys Sharpe

Basilan: 15 km. northeast of Maluso, 1 ♂, 1 not sexed, 16 and 25 April, 1937.

Iole rufigularis (Sharpe)

Mindanao: Zamboanga, 1 ♂, 2 April.
Basilan: 15 km. northeast of Maluso, 1 ♂, 21 April, 1937.

This species is confined to Mindanao and Basilan and might be considered a member of the *gularis* group if the two did not occur together on Mindanao. *I. rufigularis* is readily told from its congener by slightly greater size and by its lack of narrow white shaft stripes on the throat.

Iole gularis mindorensis (Steere)

Mindoro: Pasi, 5 ♂, 1 ♀, 4–11 March; Calawang, 2 ♂, 1 ♀, 6–9 April; Anuling, 2 ♂, 7 April; Carayrayan, 1 ♀, 13 April; Bayog, 1 ♂, 10 April; Mt. Halcon, 3 ♂, 1 ♀, 18–21 April, 1937.

The earliest specific name for the species known as *Iole gularis* is *Turdus philippensis* Gmelin 1789, but it is preoccupied twice over by *Turdus philippensis* of Müller 1776, and of Boddaert 1783.

Pycnonotus goiavier goiavier (Scopoli)

Mindoro: Pasi, 1 ♂, 2 ♀, 4 March; Antipolo, 1 ♂, 11 March; Calawang, 2 ♂, 3 and 6 April; Carayrayan, 3 ♂, 13 April, 1937.

My topotypical material of this form from Luzon is unsatisfactory, but the Mindoro series collected by Rivera gives the following wing and tail measurements:

	Wing	Tail
♂	84	82
	83	77
	86	83.5
	77	76
	80	80
	79	77
♀	77	77
	79	77.5

Pycnonotus goiavier suluensis Mearns

Mindanao: Zamboanga, 4 ♂, 28 March–5 April, 1937.

This form was described by Mearns with type from Sulu and attributed by him to Basilan and Mindanao in addition. The characters were relatively shorter tail, broader white supraorbital stripes and paler auricular patch. There certainly is nothing diagnostic about the tail measurements; the three adult males in this series measure as follows:

wing	83.5	tail	77.5
	81.5		78
	84		81

The same three specimens all uphold the character of broader supraorbital stripes and paler auricular patch; in addition the anteocular spot seems to be more extensive.

TURDIDAE

Calliope calliope (Pallas)

Luzon: Lagangilang, 1 ♂, 28 January, 1937.

Monticola solitaria philippensis (P. L. S. Müller)

Luzon, Mt. Santo Tomás, 1 ♂, 8 January; Lagangilang, 1 ♂, 1 ♀, 25 and 28 January, 1937.

Copsychus mindanensis (Boddaert)

Luzon: Lagangilang, near Bangued, 2 ♂, 2 ♀, 18–27 January.
Mindoro: Calawang, 1 ♂, 1 ♀, 14 April.
Mindanao: Zamboanga, 2 ♂, 30 March and 12 April.
Basilan: 15 km. northeast of Maluso, 1 ♀, 19 April, 1937.

In spite of its wholly black tail, it would probably not be incorrect to regard this species as the Philippine representative of the *Copsychus saularis* group.

Saxicola caprata caprata (Linné)

Luzon: Lagangilang, near Bangued, 1 ♂, 14 January, 1937.

SYLVIIDAE

Cisticola exilis rustica Wallace

Mindoro: Binugsucan, 2 ♂, 1 ♀, 5 May, 1937.

With ample material Lynes was unable to distinguish any geographic races of *Cisticola exilis* from the Moluccas, Celebes and the Philippines, but united them all under Wallace's *rustica*, the type of which came from Buru. Should the Philippine bird prove separable *Cisticola semirufa* Cabanis, based on a specimen from Luzon, is available.

Locustella fasciolata Gray

Basilan: 15 km. northeast of Maluso, 1 ♂, 21 April, 1937.

This species, which breeds in eastern Siberia, has not been previously taken on Basilan, though it winters as far east as the Moluccas and has been recorded from many islands in the Philippines.

Megalurus palustris forbesi Bangs

Mindoro: Pasi, 1 ♀, 4 March; Bayog, 1 ♀, 2 May; Calawang, 1 ♂, 4 May; Binugsucan, 2 ♂, 1 ♀, 5 May.
Mindanao: Zamboanga, 1 ♂, 30 March, 1937.

The resident race of the Striated Grass Warbler shows little or no variation; in addition to the specimens listed above, I have examined 3 ♂ (including the type) and 2 ♀ from Luzon, and 1 ♂ each from Panay and Samar. I can detect no appreciable color differences and the

size range is negligible, as can be seen from the following wing measurements:

Males: Luzon, 95.5, 96, 98; Mindoro, 94, 95, 98.5; Panay, 94; Samar, 96; Mindanao, 95.5.
Females: Luzon, 84, 87; Mindoro, 85, 86, 87.

Phylloscopus borealis borealis (Blasius)

Luzon: Lagangilang, near Bangued, 1 ♂, 1 ♀, 17 and 28 January.
Mindoro: Pasi, 1 ♂, 5 March; Mt. Halcon, 1 ♂, 1 ♀, 18 and 21 April, 1937.

Phylloscopus borealis xanthodryas Swinhoe

Luzon: Baguio, 1 ♂, 6 January.
Mindoro: Calawang, 1 ♂, 5 April, 1937.

Apparently the Mindoro specimen constitutes the first record for the eastern race of the Willow Warbler from that island, a fact that may be of local interest but of no special significance, since this race has been recorded from islands both north and south of Mindoro.

Cryptigata nigrorum nigrorum Moseley

Luzon: Baguio, 1 ♂, 6 January, 1937.

I have no topotypical material from Negros for comparison.

Horeites cantans borealis (Campbell)

Luzon: Lagangilang, near Bangued, 1 ♂, 31 January, 1937.

This specimen belongs to the pale northern form of the Bush Warbler which breeds in Ussuriland, Manchuria and Korea. McGregor records examples of this species (under name of *Horornis canturians*) from Apo, Calayan and Luzon, but without a reexamination of the skins it is of course impossible to tell to what subspecies they belong. Hachisuka records a specimen from northern Luzon under the name of *Horornis canturians taivanorum* Hachisuka, a name that certainly must go into the synonymy of *borealis*.

Orthotomus frontalis frontalis Sharpe

Mindanao: Zamboanga, 1 ♀, 28 March, 1937.

Orthotomus frontalis mearnsi McGregor

Basilan: 15 km. northeast of Maluso, 1 ♀, 17 April; near Isabela, 1 ♀, 10 May, 1937.

Orthotomus cinereiceps Sharpe

Basilan: 15 km. northeast of Maluso, 1 imm. ♀, 21 April, 1937.

Ortiiotomus chloronotus Ogilvie-Grant

Luzon: Lagangilang, near Bangued, 1 ♂, 1 ♀, 14 January, 1937.

The reference to the original description as given both in Sharpe's Hand-list and in McGregor's Manual is wrong; the correct citation is Bull. Brit. Orn. Cl., **5** (not **3**), 31 Oct. 1895, p. ii (not 2).

I am strongly of the opinion that this so-called species will eventually be regarded as a race of *O. sericeus* Temminck and would even treat it as such were it not for *O. derbianus* Moore, a Luzon form that I have not been able to examine, but which from the description is certainly one of the *sericeus* group. Until the distribution of the two forms on Luzon is known it is of course necessary to accord one of them specific rank. In a short review of the *O. sericeus* (= *ruficeps* of authors) group Oberholser (1932, p. 86–90) describes as a new race *O. s. eupolius* from Sibutu Island, Philippines; this form, however, was described by Bangs (1922, p. 82) as *O. ruficeps nuntius* based chiefly on Sibutu specimens but with type from Cagayan Sulu. Specimens from Palawan and Culion do not differ appreciably from true *sericeus* of Borneo, and a single skin of an immature bird from Jolo is also apparently referable to the typical form. The other Philippine race that should be included in the *sericeus* Formenkreis is *O. castaneiceps* Walden which inhabits the islands of Bantayan, Guimares, Masbate, Negros, Panay and Ticao.

MUSCICAPIDAE

Hemichelidon griseisticta Swinhoe

Luzon: Lagangilang, near Bangued, 1 ♂, 17 January.
Mindoro: Pinamalayan, 1 ♂, 9 March, Subaan, 1 ♀, 14 March; Mt. Halcon, 1 ♂, 1 ♀, 21 April.
Basilan: 15 km. northeast of Maluso, 1 ♂, 1 ♀, 21 and 29 April, 1937.

This species breeds in eastern Asia and winters from the Philippines to New Guinea. Parrot (1907, p. 168) named *H. g. habereri* from the Kurile Islands, but this proposed form has been universally synony-

mized. Hachisuka has recently referred three unusually large specimens from the Philippines to this race, but present evidence does not warrant its recognition.

Cyornis beccariana simplex Blyth

Luzon: Lagangilang, near Bangued, 3 ♀, 13–27 January, 1937.

This form was believed by its describer to have come from Borneo, but Robinson and Kinnear (1928, p. 246) have shown this to be an error and substituted Luzon as the correct type locality.

Cyornis beccariana philippensis Sharpe

Mindanao: near Zamboanga, 1 [♀], 2 April, 1937.

Cyornis beccariana mindorensis Mearns

Mindoro: Calawang, 1 ♀, [= ♂], 6 April; Anuling, 1 ♀, 7 April; Mt. Halcon, 1 ♀, 24 April, 1937.

At least four races of *C. beccariana* occur in the Philippines; Stresemann has named the Palawan race *littoralis,* but Robinson and Kinnear provisionally synonymize it with true *beccariana.* I have not seen it. The Luzon form, *simplex,* is a rather pale race, both sexes show the light blue supraloral stripe conspicuously; *simplex* is also said to occur on Marinduque. With the exception of Palawan, Luzon, Marinduque and Mindoro, the Philippines are inhabited by *philippensis;* this race is somewhat more richly colored than *simplex* and the supraloral band less conspicuous; adequate series from the numerous islands on which this race occurs might show the need for additional subdivision. *C. b. mindorensis* is a richly colored race, darker blue above and deeper and more extensively orange rufous below.

Hypothymis azurea azurea (Boddaert)

Luzon: Lagangilang, near Bangued, 1 ♀, 21 January.
Mindoro: Merit, 2 ♂, 1 ♀, 6 March; Pasi, 1 ♂, 10 March; Subaan, 1 ♀, 12 March; Anuling, 2 ♂, 1 ♀, 7 April; Carayrayan, 1 ♂, 1 ♀, 13 April; Mt. Halcon, 3 ♂, 20 April, 1937.

Hypothymis azurea compilator subspec. nov.

Mindanao: near Zamboanga, 1 – [= ♀], 2 April.
Basilan: 15 km. northeast of Maluso, 1 ♂, 23 April; near Isabela, 1 ♂, 6 May, 1937.

Type: Museum of Comparative Zoölogy, no. 194555; adult ♂, from 15 km. northeast of Maluso, Basilan, Philippine Islands. Collected 23 April, 1937, by Barbara Lawrence. Original no. 652.

Characters. Similar to *H. a. azurea* (Boddaert) but white area of abdomen more extensive. Similar also to *H. a. leucophila* Oberholser of the Pagi Islands, but darker and more purplish blue. (The ♀ *leucophila,* however, is very different from any of the females of the Philippine forms.)

After examining a considerable series of *H. azurea* from the Philippines I think the description of this new form is advisable and that the single rather striking character relied on for its separation is geographic and not individual; it is apparent not only in three males from Basilan but in three males from Mindanao (U.S.N.M.) Basilan, and a male from Samar (M.C.Z.), while not one of the Mindoro series has it. Three topotypical Luzon males kindly loaned by the U. S. National Museum agree with the Mindoro birds as do specimens from Guimaras (M.C.Z. and U.S.N.M.) and Panay (U.S.N.M.). I am sorry to have to leave in abeyance the question of subspecific identity of the birds upon so many islands of the Archipelago whence specimens do not seem to be available at present, but take this occasion to point out that the birds of the Palawan group, at least Palawan (M.C.Z. and U.S. N.M.) and Balabac (U.S.N.M.), are nearer to *H. a. prophata* of Borneo than to the typical race of the northern Philippines. *Prophata* has the posterior underparts in the ♂ almost entirely washed with bluish and the ♀ has the head less intensely blue and the throat decidedly washed with grayish; on the whole the Palawan birds should be referred to *prophata.*

Muscicapa azurea Boddaert is based solely on Le Petit Azur of Buffon, 8 (12mo ed.), p. 329, and on Daubenton Pl. enlum., pl. 666, fig. 1, where the species described by Buffon is figured as "Gobemouche bleu, des Philippines." The type locality therefore is the Philippine Islands and I cannot find that it has been further restricted. Since it now becomes necessary to do so, I designate Manila, Luzon, Philippine Islands, as the type locality. Daubenton's plate shows a bird with an extensively white abdomen and it might be argued that it applies to the bird here described as new, but reference to Buffon's text distinctly mentions the wash of blue extending over the abdomen, and it may be safely assumed that the plate is inaccurately colored.

Cyanomyias coelestis

Basilan: 15 km. northeast of Maluso, 1 ♂, 23 April, 1937.

A fine specimen of this rare flycatcher.

Gerygone fusca sulphurea Wallace

Mindanao: Zamboanga, 1 ♂, 1 ♀, 28 and 30 March, 1937.

This wide ranging form inhabits the Malay Peninsula, southern Siam, Sumatra, Engano, Java, Banka, southern Borneo, the Philippines (including the Sulu Archipelago, but excluding Palawan) and the chain of the Lesser Sunda Islands eastward to Alor. Several races have been named within this range including *simplex* Cabanis and *rhizophorae* Mearns both from the Philippines, but Meise (1930, pp. 371–372) who has carefully revised the entire genus is unable to discover any constant racial characters within the wide area outlined above. If *rhizophorae* is ever recognized, Miss Lawrence's two specimens must be referred to it, since they are topotypes.

Rhipidura superciliaris superciliaris (Sharpe)

Basilan: 15 km. northeast of Maluso, 1 ♂, 30 April; near Isabela, 1 ♂, 4 May, 1937.

This species was originally described as a Hypothymis and for many years was placed in that genus, but except for its blue color, such a generic allocation was hardly justified. McGregor in 1909 removed it to Rhipidura. Two years later Oberholser (1911, p. 587) made *H. superciliaris* the type of a new genus Cyanonympha, but in my opinion this was unnecessary; removing it to Rhipidura being sufficient to convey a proper idea of its systematic position.

Rhipidura cyaniceps cyaniceps (Cassin)

Luzon: Baguio, 2 ♂, 1 ♀, 6 and 7 January, 1937.

This form is known only from Luzon; on Tablas it is replaced by an allied race *R. c. sauli* Bourns and Worcester. A related species *R. albiventris* Sharpe occurs on Masbate, Ticao, Panay, Guimaras, Negros. It is difficult to account for the absence of representative forms of *R. cyaniceps* from so many of the other principal islands in the Philippines.

Rhipidura javanica nigritorquis Vigors

Luzon: Lagangilang, near Bangued, 1 ♂, 14 January, 1937.

Rhinomyas ruficauda ruficauda (Sharpe)

Basilan: 15 km. northeast of Maluso, 1 ♀, 1 sex not determined, 16 and 25 April, 1937.

R. ruficauda is confined to the mountains of northern Borneo where it is represented by a race on Mt. Dulit and another on Mt. Kina Balu, and to the southern Philippines where *samarensis* inhabits Samar, Bohol, Leyte and Mindanao, *ruficauda* Basilan and *ocularis* some of the islands of the Sulu Archipelago.

Culicicapa helianthea panayensis (Sharpe)

Luzon: Baguio, 2 ♀, 5 and 7 January, 1937.

Luzon specimens differ from true *helianthea* of Celebes in being slightly more yellowish green above and the bright yellow band across the rump more extensive and sharply contrasted with the lower back; tail relatively shorter. There is also a difference in the color of the bill and feet; in skins *h. helianthea* has a brown upper mandible and pale legs and feet, while *h. panayensis* has a black upper mandible and brown legs and feet. Meyer and Wiglesworth (1, 1898, p. 387) quote Everett as authority for the statement that the Celebes bird has the upper mandible "dark sepia" and legs and feet light sepia, while McGregor gives black for the mandible and dark brown for feet and legs of the Philippine race.

Stoparola panayensis nigrimentalis Ogilvie-Grant

Luzon: below Baguio at elevation of 2500 feet, 1 not sexed, 5 January, 1937.

MOTACILLIDAE

Motacilla cinerea caspica (Gmelin)

Luzon: Baguio, 1 ♀, 7 January; Mt. Santo Tomás, 1 ♀, 16 February, 1937.

Motacilla flava simillima (Hartert)

Mindoro: Calawang, 1 ♂, 1 ♀; 14 April, 1937.

This form of the Gray-headed Wagtail breeds in Kamchatka and the northern Kurile Islands.

Motacilla flava alascensis >< plexus

Mindoro: Casungo, 2 ♂, 1 May, 1937.

No one has made any serious effort at the subspecific allocation of the migrant individuals of *Motacilla flava* occurring in winter in the Philippines, since the publication of Sushkin's revision of this group (1925, pp. 30–37). There are two specimens in the M.C.Z. taken in Benguet Province, Luzon, by Governor General Forbes in the spring of 1913; these were examined by Sushkin and referred to *simillima;* a specimen from Lake Liguason, Mindanao, also taken by Governor General Forbes in the spring of 1913 was likewise identified by Sushkin as *simillima.*

The two Calawang, Mindoro birds are clearly identifiable as *simillima;* the ear coverts are little darker than the crown, there is a well defined white eyebrow from the base of the bill to the occiput and the dusky spots on the throat are not arranged in the shape of a collar. The two specimens listed herewith from Casungo, Mindoro, are not as readily disposed of. They are not birds with gray ear coverts like *simillima* or *alascensis* but with blackish ear coverts like *plexus* or *thunbergi;* the eyebrow is narrower than in *simillima,* more as in *alascensis;* the dusky spots on throat are better developed forming a rough band or collar just as in *alascensis.* I am inclined to think that these birds represent a breeding population from somewhere in northeastern Siberia between the ranges of *plexus* (which breeds at least east to the mouth of the Kolyma) and *alascensis* (breeds on the Chukchi Peninsula). I have seen no specimen of *taivanus* from the Philippines. McGregor uses the name *leucostriatus* of Homeyer 1878 (= *taivanus* Swinhoe) for the birds of this sort, but his description is obviously taken from *simillima* or a closely allied race, since he lays particular stress on the "long white supercilium"; *taivanus* has a clear yellow eyebrow.

Anthus hodgsoni hodgsoni Richmond

Luzon: Baguio, 1 ♀, 2 not sexed, 3–7 January, 1937.

Hartert and Steinbacher (1933, pp. 137–138) place *A. h. berezowskii* Zarud. and *A. h. yunnanensis* Kuroda and Uchida in the synonymy of the nominate form, and themselves describe *A. h. innominatus* as the race of northeastern Asia. Since the three specimens taken by Miss Lawrence are of the heavily marked type they cannot be *innominatus,* which is characterized by weak streaking both above and below.

ARTAMIDAE

Artamus leucoryn leucoryn (Linné)

Luzon: Lagangilang, near Bangued, 2 ♂, 2 ♀, 19 and 28 January.
Mindoro: Pasi, 3 ♂, 1 ♀, 5 March; Calawang, 1 ♀, 6 April; Anuling, 1 ♀, 11 April; Binugsucan, 1 ♀, 5 May, 1937.

Many of the specific names, such as this one, in Linné's "Mantissa" were abbreviated in order not to have the last syllable come on the line below. It has been customary for authors to write these names out in full, but there is nothing in the International Code that would sanction this practice. "The original orthography of a name is to be preserved unless an error of transcription, a *lapsus calami* or a typographical error is evident." An abbreviated name does not fall into any of these categories.

STURNIDAE

Sarcops calvus calvus (Linné)

Luzon: Lagangilang, near Bangued, 1 ♀, 22 January.
Mindoro: Pasi, 2 ♂, 1 ♀, 4–7 March; Calawang, 1 ♂, 2 ♀, 6–9 April; Anuling, 1 ♂, 1 ♀, 7 April; Bayog, 1 ♂, 2 ♀, 10 April; Mt. Halcon, 1 ♂, 1 ♀, 24 and 25 April; Ariaod, 2 ♂, 8 May, 1937.

Sarcops calvus melanonotus Ogilvie-Grant

Basilan: 15 km. northeast of Maluso, 2 ♂, 20 April, 1937.

It is rather difficult to decide from the written evidence as well as from fresh material just what the status of *melanonotus* is. According to Ogilvie-Grant birds of the *calvus* type, *i.e.*, with entirely silvery gray upper parts from neck to upper tail coverts inhabit the Philippines westward of long. 122°E and the *melanonotus* style, *i.e.*, with the silvery color of the upper parts interrupted by a black area across the back, are found chiefly east of long. 122°. According to McGregor both forms have been found in Luzon and Bohol. Reference to his list of localities under each form shows both attributed to Basilan, Marinduque, Mindanao and Tablas as well.

The Luzon specimen taken by Miss Lawrence and the Mindoro series collected by Rivera are clearly *S. c. calvus*, and Miss Lawrence's two skins from Basilan are surely referable to *melanonotus*. In addition the M.C.Z. possesses eight other skins of this species. Two of

these, both from Luzon (Manila and Irisan), are *calvus* plainly enough. The remaining six, all of which must be referred to *melanonotus* are distributed as follows: 1 ♀, Lubang (northwest of Mindoro); 1 ♂, Samar; 1 ♂, 1 ♀, Darsena Island (one of "Los Naranjos" lying about 22 km. due south of the southeasternmost extremity of Luzon); 1 ♂, Guimaras; 1 ♂, Basilan.

I am rather inclined to the belief that *melanonotus* is not really a geographical race in the true sense, but that on certain islands there is a tendency to the production of "melanistic mutants," which really accounts for two forms occurring on the same island.

Aethiopsar cristatellus cristatellus (Linné)

Luzon: Lagangilang, near Bangued, 1 ♀, 29 January, 1937.

Aplonis panayensis panayensis (Scopoli)

Mindoro: Anuling, 1 ♂, 6 May.
Basilan: 15 km. northeast of Maluso, 1 imm. ♂, 2 ad. ♀, 17–29 April, 1937.

LANIIDAE

Lanius schach nasutus Scopoli

Luzon: Lagangilang, near Bangued, 1 ♀, 25 January.
Mindanao: Zamboanga, 1 ♂, 12 April, 1937.

Lanius cristatus lucionensis Linné

Luzon: Lagangilang, 2 ♂, 2 ♀, 14–29 January.
Mindoro: Pasi, 1 ♂, 4 March; Merit, 1 ♂, 6 March; Calawang, 2 ♀, 6 and 9 April; Anuling, 1 ♂, 11 April; Paltabaan, 1 ♂, 15 April; Ariaod, 1 ♀, 9 May.
Mindanao: Zamboanga, 1 ♂, 3 March, 1937.

This is a rather unsatisfactory series for positive subspecific identification of every skin because of a large proportion of immature or subadult birds and the fact that the Mindoro specimens are molting badly. Strangely enough the Mindanao bird has already completed the molt and is in fine fresh feather.

Hyloterpe (philippensis?) albiventris Ogilvie-Grant

Luzon: Baguio, 1 ♂, 1 ♀, 7 January, 1937.

According to Hachisuka (1930, p. 199) H. *albiventris* is the Luzon highland representative of *H. philippensis* which is also restricted to Luzon. I have insufficient available material of any of the Philippine forms of Hyloterpe to form the basis for discussion of their affinities, but incline to the belief that *albiventris* is not conspecific with *philippensis*. I maintain the genus Hyloterpe only tentatively; it is now merged with Pachycephala by many authors, but perhaps it would be better to await a revision of Pachycephala and allied genera before definitely lumping Hyloterpe.

Hyloterpe (philippensis?) mindorensis Bourns and Worcester

Mindoro: Pasi, 1 ♂, 4 March, 1937.

The single specimen taken by Rivera differs from *albiventris* (with which it is synonymized by McGregor) in just the characters pointed out by Bourns and Worcester (1894, p. 22) in their original description. It is a much browner bird than *albiventris;* the crown is brown without trace of olive green, the back is olive brown; outer webs of secondaries and secondary coverts reddish brown and undertail coverts darker and more buffy. If *albiventris* is regarded as specifically distinct from *philippensis*, then *mindorensis* must be considered a race of the former.

Hyloterpe philippensis apoensis Mearns

Basilan: 15 km. northeast of Maluso, 1 ♀, 26 April; near Isabela, 2 ♂, 5 and 7 May, 1937.

Lacking topotypical material of *apoensis* I follow McGregor in referring Basilan birds to that race and in regarding *basilanica* of Mearns as a synonym.

ZOSTEROPIDAE

Zosterops palpebrosa basilanica Steere

Basilan: 15 km. northeast of Maluso, 1 ♀, 18 April, 1937.

Zosterops japonica meyeni Bonaparte

Luzon: Baguio, 1 ♀?, 6 January, 1937.

Zosterops nigrorum aureiloris Ogilvie-Grant

Luzon: Lagangilang, near Bangued, 2 ♂, 1 ♀, 14–21 January, 1937.

In allocating these three forms of Zosterops to their specific groups I have followed Stresemann (1931).

DICAEIDAE

Dicaeum retrocinctum Gould

Mindoro: Merit, 1 ♂, 6 March; Subaan, 2 ♂, 1 ♀, 14 March; Calawang, 1 ♂, 6 April; Mt. Halcon, 2 ♂, 18 and 27 April, 1937.

This very distinct species is confined to Mindoro as far as known. The type is said to be from Manila but the species has not since been taken on Luzon and it is quite probable that the type never came from Luzon.

Hachisuka (1930, p. 207) believes this to be the northern representative of *D. haematostieta*, but I am unable to accept this view.

Dicaeum papuense papuense (Gmelin)

Mindanao: Zamboanga, 2 ♂, 31 March, 1937.

This form enjoys a wide range in the Philippines, occurring on most of the principal islands from Luzon to Basilan; it is replaced on Guimaras and Panay by *D. p. haematostictum* Sharpe, and on Negros by *D. p. whiteheadi* Hachisuka.

Dicaeum hypoleucum hypoleucum Sharpe

Basilan: 15 km. northeast of Maluso, 1 ♀, 24 April, 1937.

The identification of this single specimen is none too certain; it agrees with the description of the female of *hypoleucum* as given in McGregor's "Manual"; it likewise agrees with the description of the male of *mindanense*. McGregor quoting Bourns and Worcester MS states that both forms occur together on Basilan. The type of *hypoleucum* came from Basilan (Sharpe, 1876, p. 298), that of *mindanense* from Pasananca, Mindanao (Tweeddale, 1877). As near as I can judge it would appear that two very closely related subspecies are involved, and that Bourns and Worcester were in error in believing that both forms occur together.

In the reference to the original description cited by McGregor the volume no. of Nature is wrongly given as **24**; it should be **14**.

Dicaeum trigonostigmum xanthopygium Tweeddale

Mindoro: Subaan, 2 ♂, 3 ♀, 12–14 March; Anuling, 3 ♂, 7–11 April; Mt. Halcon, 3 ♂, 1 ♀, 20–27 April, 1937.

This form is certainly a race of the widely distributed *D. trigonostigmum;* it is found on Luzon and Polillo as well as on Mindoro. Apparently the following Philippine forms should also be included in *trigonostigmum; dorsale* Sharpe, Masbate, Negros and Panay; *pallidior* Bourns and Worcester, Cebu; *intermedium* Bourns and Worcester, Romblon and Tablas; *sibuyanicum* Bourns and Worcester, Sibuyan; *assimile* Bourns and Worcester, Jolo and Tawi Tawi; *sibutuense* Sharpe, Sibutu; *cinereigulare* Tweeddale, Bohol, Leyte, Mindanao and Samar; *besti* Steere, Siquijor.

Dicaeum pygmaeum pygmaeum (Kittlitz)

Luzon: Lagangilang, near Bangued, 1 ♂, 17 January.
Mindoro: Subaan, 1 ♂, 12 March; Pasi, 1 ♂, 13 March; Paltabaan, 1 ♀, 15 April; Mt. Halcon, 3 ♂, 2 ♀, 18 April, 1937.

Prionochilus bicolor inexpectatus Hartert

Mindoro: Subaan, 2 ♂, 12 March, 1937.

NECTARINIIDAE

Aethopyga shelleyi flavipectus Ogilvie-Grant

Mindoro: Anuling, 1 ♂, 7 April; Mt. Halcon, 1 ♂, 2 ♀, 20–23 April, 1937.

Eudrepanis pulcherrima jefferyi Ogilvie-Grant

Luzon: Mt. Santo Tomás, 1 ♂, 16 February, 1937.

Cinnyris sperata henkei A. B. Meyer

Luzon: Lagangilang, near Bangued, 4 ♂, 2 ♀, 13–19 January, 1937.

This form is the representative of *C. sperata;* it inhabits the Babuyanes Islands and the northern part of Luzon; I am unable to state just where the boundary lies between this form and the next. It is the

exact counterpart of *C. s. sperata* except that the maroon portions of the latter are replaced by velvety black and the top of the head is iridescent green instead of coppery; females of the two races are indistinguishable.

Cinnyris sperata sperata (Linné)

Mindoro: Merit, 1 ♂, 6 March; Pasi, 3 ♂, 4 ♀, 4–10 March; Subaan, 1 ♂, 1 ♀, 12 March; Calawang, 7 ♂, 1 ♀, 6–14 April; Anuling, 2 ♂, 2 ♀, 7–11 April; Bayog, 1 ♂, 1 ♀, 10 April; Ariaod, 1 ♀, 8 April; Salibagon, 1 ♂, 17 April; Mt. Halcon, 1 ♂, 2 ♀, 24–26 April, 1937.

The Red-breasted Sunbird is widely distributed throughout the Philippines, being recorded from nearly every island from southern Luzon south to, but not including, Mindanao; it also occurs on Palawan. From Mindanao southward its place is taken by the next form. Through a strange lapsus Chasen (1935, p. 277) refers to this species as *Leptocoma brasiliana sperata*, although *brasiliana* dates from Gmelin 1789 and *sperata* from the 12th edition of Linné 1766.

The use of the genus Leptocoma seems to me unnecessary; it is too close to Cinnyris.

Cinnyris sperata juliae (Tweeddale)

Basilan: 15 km. northeast of Maluso, 2 ♂, 2 ♀, 17–24 April, 1937.

Cinnyris jugularis jugularis (Linné)

Luzon: Lagangilang, near Bangued, 2 ♂, 3 ♀, 13–20 January.
Mindoro: Pasi, 1 juv. ♀, 4 March; Subaan, 2 ♂, 3 ♀, 12–14 March; Calawang, 4 ♂, 1 ♀, 6–14 April; Salibagon, 1 ♂, 17 April; Binugsucan, 1 ♀, 5 May.
Mindanao: Zamboanga, 2 ♂, 1 ♀, 30 and 31 March.
Basilan: Near Isabela, 1 ♀, 5 May, 1937.

Anthreptes malacensis chlorigaster Sharpe

Basilan: 15 km. northeast of Maluso, 4 ad. ♂, 2 imm. ♂, 1 ♀, 17–30 April, 1937.

Anthreptes griseigularis (Tweeddale)

Luzon: Lagangilang, near Bangued, 1 ♀, 17 January, 1937.

This specimen is grayer, less greenish than a ♀ from Bataan Province, Luzon, but is in very fresh plumage and not fully adult. Although

griseigularis looks as though it should be considered a subspecies of *malacensis*, both occur on Mindanao and the two must, therefore, be kept specifically distinct.

PLOCEIDAE

Lonchura atricapilla jagori (Martens)[1]

Luzon: Lagangilang, near Bangued, 2 ♀?, 20 January.
Mindoro: Binugsucan, 1 ♂, 5 May; Ariaod, 1 ♂, 9 May, 1937.

Lonchura punctulata cabanisi (Sharpe)

Luzon: Lagangilang, near Bangued, 1 ♂, 15 January, 1937.

Lonchura leucogastra everetti (Tweeddale)

Basilan: 15 km. northeast of Maluso, 2 ♀, 23 and 24 April, 1937.

[1] The earlier *Fringilla minuta* Meyen, is a homonym of *Fringilla minuta* Temminck.

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1932. Id., pt. 2, Jan., pp. 97–192.
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CAMBRIDGE, MASS., U. S. A.
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No. 3. — *Revision of the African Snakes of the Genera Mehelya & Gonionotophis*

By Arthur Loveridge

(with 2 text-figures)

The recent receipt by the Museum of Comparative Zoölogy of several file snakes from Ganta, Liberia, results in the addition of two species to the fauna of that country. It has also resulted in my attempting a revision of the complicated records of the group, in order that I might be able to apply the correct names to our specimens.

For the genus *Gonionotophis*, however, our material was very scanty, so I appealed to Mr. H. W. Parker for information on several points. With characteristic generosity he placed at my disposal manuscript notes on this genus which he had made some years ago. As a result I am able to add certain details, as mentioned in the following text, and it is encouraging to find that in every instance we had independently reached the same conclusions regarding synonymy.

In consequence of this enquiry I am led to consider the undermentioned species as synonyms.

Simocephalus baumanni Sternfeld = *Mehelya guirali* (Mocquard)
Simocephalus chanleri Stejneger = *Mehelya c. savorgnani* (Mocquard)
Gonionotophis microps Boulenger = *Mehelya stenophthalmus* (Mocquard)
Simocephalus insignis Chabanaud = *Gonionotophis brussauxi* (Mocquard)
Simocephalus rostralis Sternfeld = *Gonionotophis grantii* (Günther)

From this it will be concluded that the relationship between the two genera, *Mehelya* and *Gonionotophis*, is of the closest nature. Between them *M. nyassae* appears to occupy an intermediate position, as it agrees with *Mehelya* in generic characters, notably in its dentition. Were this not the case the genera could be separated on the basis of those with over 200 ventrals and those with less than 180. In this respect *nyassae*, with from 171–179 ventrals, is nearer to *Gonionotophis grantii* than to any of its relatives in the genus *Mehelya*.

Boulenger (1893b) failed to give prominence to this close relationship in the arrangement which he adopted in the Catalogue of Snakes in the British Museum, owing to the scanty material at his disposal. Some of the characters which he employed for distinguishing between the two genera have since broken down. This is the case with the apical pits, said to be present on the scales of *Gonionotophis* though absent from those of *Simocephalus* (*i.e. Mehelya*). Some years ago

Müller (1910, p. 596) pointed out the absence of pits in both *grantii* and *vossi* (the latter now regarded as a synonym of *brussauxi*). Quite independently both Parker and I reached the same conclusion, the former with both species, the latter with only *brussauxi* available.

The presence or absence of lateral keels on the ventrals appears to be masked at times by the state of preservation. The number of ventrals cannot be utilised on account of *nyassae*, as detailed above. The only easily ascertainable character for separating the genera would, therefore, appear to be as follows:

Maxillary teeth forming an interrupted series . . . . . *Mehelya* (p. 132)

Maxillary teeth forming a continuous series . . . . . *Gonionotophis* (p. 149)

Mehelya has five species in French Cameroon, four of which also occur in the French and Belgian Congo. The centre of distribution for both genera would appear to be the French Cameroon, whence they radiated westwards to Portuguese Guinea, and, in the case of *Mehelya*, south to Angola, eastwards to the coast of Italian Somaliland and then southwards to Natal.

For the following account 1,600 titles were examined, but references to these two genera were found in only 125. Except for the references to original descriptions, citations are given in an abbreviated form which will be found in full in the bibliography at the end of this paper. Here I have endeavoured to bring together all that has been recorded of each species, reducing over-lengthy descriptions, but including all of what little is known of their breeding habits, diet, etc.

Genus Mehelya

1847. *Heterolepis* Smith (*non* Nees, 1834), Ill. Zoöl. S. Africa, Rept., footnote to pl. lv (type *capensis*).
1854. Duméril & Bibron, p. 419.
1863. Günther, p. 359.
1863. Jan (part), p. 94.
1887a. Moequard (part), p. 8.
1858. *Simocephalus* Günther (*non* Schödler, mid. ix. 1858), 9.x.1858, Cat. Snakes Brit. Mus., p. 194 (*n.n.* for *Heterolepis* A. Smith, preoccupied).
1863. Günther (part), p. 359.
1891e. Boulenger, p. 344.
1917b. Chabanaud, p. 11.
1903. *Grobbenia* Poche (*non* Holdhaus, 28.vii.1903), 21.ix.1903, Zoöl. Anz., **26**, p. 699 (type *poensis*).

1903. *Méhelya* Csiki, 15.xi.1903, Rovartani Lapok, **10**, p. 198, footnote (*n.n.* for *Grobbenia* Poche, preoccupied).
1904. Csiki, p. 266.
1904. *Siebenrockia* Poche, 13.ix.1904, Zoöl. Anz., **28**, p. 38 (*n.n.* for *Grobbenia* Poche, preoccupied).

Maxillary and dentary bones angularly bent inwards anteriorly; the 8 or 9 anterior maxillary teeth increasing in size and followed *after an interval* by 15 to 28 very small teeth; anterior mandibular teeth increasing in size, the eighth or ninth largest. Head very distinct from neck, much depressed; eye moderate or small, with vertically elliptic pupil; nostril very large. Body subtriangular or cylindrical; scales keeled, without apical pits, in 15 to 19 rows at midbody, those of the vertebral series enlarged and bicarinate; ventrals more than 170, with a more or less distinct lateral keel. Tail moderate; subcaudals in two rows. Hypapophyses developed throughout the vertebral column.

Range. Tropical and southeast Africa.

Synopsis of the Species

I. Midbody scales in 19 rows.
Ventrals 229; subcaudals 68.
(Cameroon) ..... *riggenbachi*
(p. 134)

II. Midbody scales in 17 rows.
Ventrals 234–238; subcaudals 53.
(Dahomey; Nigeria) ..... *crossi*
(p. 135)

III. Midbody scales in 15 rows.

A. Three labials, the third, fourth and fifth, enter the orbit.
Ventrals 236–262; subcaudals 59–70.
(Liberia; Togo; Nigeria; British and French Cameroons; French Congo) ..... *guirali*
(p. 136)

B. Two labials, the third and fourth, enter the orbit (only very rarely the fifth also).
1. Secondary keels on scales strongly developed.
a. Coloration of scales in vertebral series uniform with that of dorsals and laterals.
Ventrals 218–239; subcaudals 53–65; postoculars 2, very rarely 1 or 3.
(French Cameroon; French and Belgian Congo; A.-E. Sudan; Uganda; Kenya; southern Italian Somaliland) ... *c. savorgnani*
(p. 137)

Ventrals 221–225; subcaudals 51–57; postoculars lacking. (Italian Somaliland north of Kismayu) ..... *c. fiechteri* (p. 141)

b. Coloration of scales in vertebral series distinct from that of dorsals and laterals.

Ventrals 203–224; subcaudals 47–56; postoculars 1 or 2. (Tanganyika; Zanzibar; Mozambique; Nyasaland; Bechuanaland; Angola; Southern Rhodesia; Natal; eastern Cape Province) ..... *c. capensis* (p. 142)

2. Secondary keels on scales absent or represented by two short and obtuse ones in the apical region.

a. Diameter of eye greater than its distance from the mouth, larger than the nostril.

Ventrals 240–256 (239–262 *fide* Boulenger); subcaudals 96–109. (French Guinea east to Uganda, south to Angola) ..... *poensis* (p. 144)

b. Diameter of eye less than its distance from the mouth, scarcely larger than the nostril.

Ventrals 198–214 (228 *fide* Sternfeld); subcaudals 47–60. (Portuguese Guinea; Gold Coast; Togoland; French Cameroon; French and Belgian Congo) ..... *stenophthalmus* (p. 146)

Ventrals 171–176; subcaudals 55–63; lowest lateral scale-row obtusely keeled. (Lake Kivu east to Tana River, Kenya Colony, south to Durban, Natal) ..... *nyassae* (p. 148)

Mehelya riggenbachi (Sternfeld)

1910d. *Simocephalus Riggenbachi* Sternfeld, Mitt. Zoöl. Mus. Berlin, **5**, p. 63: Ubac, Cameroon.
1919b. Boulenger, p. 281.
1929a. *Mehelya riggenbachi* Werner, p. 55.

Description. Frontal slightly shorter than the parietals; preocular 1; postoculars 2; labials 7; temporals 1+2. Midbody scales in 19 (23–25 on neck) rows, very strongly keeled; ventrals 229; subcaudals 68 pairs.

Coloration. Above, dark brown, except the lips and tips of dorsals which are whitish yellow; below, yellow, the outer ends of each ventral dark.

Measurements. Total length 1050 mm.

Diet. The stomach of the type held a young snake (*Dromophis lineatus*), which had been swallowed tail first.

Distribution. Cameroon: Ubac. (Not located).

Remarks. Known only from the type (*non vidi*) in the Berlin Museum. From the brief description it would appear that *riggenbachi* differs only from *M. c. savorgnani*, also of the Cameroon, in possessing six more caudals and the higher number of midbody scale-rows. Fifteen, however, is so constant for *capensis* and its races that nineteen cannot be assumed to be within the range of possible variation.

Mehelya crossii (Boulenger)

1895f. *Simocephalus Crossii* Boulenger, Ann. Mag. Nat. Hist. (6), **16**, p. 33: Asaba, lower Niger River, Southern Nigeria.
1896d. Boulenger, p. 618.
1910. Lönnberg, p. 4.
1919b. Boulenger, p. 281.
1929a. Werner, p. 55.
1933f. Angel, p. 96.
1916f. *Simocephalus capensis* Chabanaud (non Smith), p. 369.

Description. Rostral nearly twice as broad as deep, just visible from above; internasals as broad as, or broader than, long, two-thirds to three quarters the length of the prefrontals; frontal as long as, or shorter than, broad, as long as, or longer than, its distance from the rostral, much shorter than the parietals; loreal as long as, or shorter than, deep; preocular 1; eye moderately large (Nigeria) or small (Dahomey); postoculars 2; upper labials 7, the third and fourth entering the orbit; temporals 1+2 (Nigeria) or 2+3 (Dahomey); 4 lower labials in contact with the anterior chin-shields, which are as short as the posterior. Midbody scales in 17 rows, strongly keeled; ventrals 234–238; anal entire; subcaudals 53 pairs.

Coloration. Above, blackish, or bright brown; below, yellowish or rosy white, the outer ends of each ventral dark.

Measurements. Total length 1250 (1100+150) mm.

Distribution. Upper *Dahomey. Southern Nigeria:* Asaba.

Remarks. Known only from the type in the British Museum and a larger example in Paris, apparently the specimen referred to *capensis* by Chabanaud and later identified with *crossii* by Angel. The latter suggests that *riggenbachi* may prove to be a synonym, but this is doubtful unless there was a miscount in the number of midbody scale-rows.

Mehelya guirali (Mocquard)

1884a. *Heterolepis bicarinatus* Sauvage (*non* Duméril & Bibron), p. 145.
1887a. *Heterolepis Guirali* Mocquard, Bull. Soc. Philom. Paris (7), **11**, p. 23, pl. ii, figs. 3–3c: Niger River, French West Africa.
1889. *Heterolepis poensis* Boettger (part), p. 279.
1893b. *Simocephalus guirali* Boulenger, p. 346.
1896d. Boulenger, p. 617.
1897b. Moequard, p. 13.
1897. Sjöstedt, p. 24.
1898. Werner, p. 208.
1900b. Boulenger, p. 452.
1902. Lampe & Lindholm, p. 17.
1908a. Sternfeld, pp. 407, 424.
1909b. Sternfeld, p. 14.
1911. Lampe, p. 190.
1915a. Boulenger, p. 203.
1919b. Boulenger, p. 280.
1933m. Witte, p. 88.
1908. *Simocephalus Baumanni* Sternfeld, Sitz. Ges. Naturf. Freunde Berlin, p. 93.
1908b. Sternfeld, pp. 214, 229, fig. 1.
1915a. Boulenger, p. 203.
1919b. Boulenger, p. 280.
1933f. Angel (part), p. 97, fig. 34.
1910. *Mehelya* (*Simocephalus*) *guirali* Lönnberg, p. 3.
1910. *Mehelya* (*Simocephalus*) *baumanni* Lönnberg, p. 4.
1929a. *Mehelya guirali* Werner, p. 55.
1938d. Loveridge, p. 57.
1929a. *Mehelya baumanni* Werner, p. 55.

Corrigenda. Heterolepis guirali and *Mehelya baumanni* have been reported in error for *M. c. savorgnani* by Bocage (1895a) and Sternfeld (1912c) respectively.

Description. Rostral nearly twice as broad as deep, just visible from above (see remarks below); internasals broader than long, two-thirds to four-fifths the length of the prefrontals; prefrontals as broad as long; frontal as long as, or slightly longer than, broad, as long as the prefrontals, much shorter than the parietals (see remarks below); loreal as long as deep; preoculars 1–2; eye moderate, larger than the nostril, its diameter greater than its distance from the mouth; postoculars 2, rarely 3; temporals 1+2; upper labials 7, the third, fourth and fifth entering the orbit; 5 lower labials in contact with the anterior chin-shields, which are a little longer than the posterior. Midbody

scales in 15 (17–19 on neck) rows, strongly keeled and striated, the striations directed obliquely towards the keels; ventrals 236–262; anal entire; subcaudals 59–70 (51–70 *fide* Boulenger) pairs.

Coloration. Above, blackish or violet brown, each scale tipped with yellow; below, yellow or white, the outer ends of each ventral dark.

Measurements. Total length 1240 (1080+160) mm.

Distribution. Belgian Congo: Kunungu. *French Congo:* Lambarene; Loango River mouth. *French Cameroon:* Bipindi; Jabassi. *British Cameroon:* Bibundi; Cape Debundsha; Victoria. *Nigeria:* Oil River. *French West Africa:* Niger River. *Togoland. Liberia:* Ganta.

Remarks. The type of *baumanni,* from Togoland, allegedly differed from *guirali* in the visible portion of its rostral, as seen from above, which was said to be equal to half its distance from the frontal. Sternfeld's figure, however, shows it as less than half and substantially the same as in an adult *guirali;* the frontal of *baumanni* is said to be as long as its distance from the end of the snout, while in *guirali* it is only as long as its distance from the rostral; the smoother keeling and the fewer ventrals (236 instead of 248–262). Most of these differences can be attributed to the fact that the type of *baumanni* was young, *i.e.* 430 (363+67) mm. Sternfeld's allegedly second example of *baumanni* from Aruwimi had but two labials entering the orbit and must be referred to *M. c. savorgnani.*

Mehelya capensis savorgnani (Mocquard)

1866a. *Heterolepis bicarinatus* Bocage (*non* Duméril & Bibron), p. 49.
1876a. *Heterolepis capensis* Peters (*non* Smith), p. 119.
1877a. Peters, p. 615.
1884a. Rochebrune, p. 182.
1887a. *Heterolepis Savorgnani* Mocquard, Bull. Soc. Philom. Paris (7), **11**, p. 27, pl. ii, figs. 4–4b: Ogowe, French Congo.
1887b. Mocquard, p. 80.
1891e. Boulenger, p. 345.
1893b. *Simocephalus chanleri* Stejneger, Proc. U. S. Nat. Mus., **16**, p. 726: Wange, *opposite* Manda Island, Kenya Colony.
1896d. Boulenger, p. 617.
1908a. Sternfeld, p. 407.
1909b. Sternfeld, p. 14.
1910a. Sternfeld, p. 17, fig. 16.
1915c. Boulenger, p. 621.
1924b. Loveridge, p. 5.
1895a. *Heterolepis Guirali* Bocage (*non* Mocquard), p. 84.

1901c. *Simocephalus phyllopholis* Werner, Zoöl. Anz., **24**, p. 301, figs. 3–4: Cameroon.
1919b. Boulenger, p. 280.
1907i. *Simocephalus Butleri* Boulenger, Ann. Mag. Nat. Hist. (7), **20**, p. 489: Between Wau and Chak Chak, Bahr el Ghazal Province, Anglo-Egyptian Sudan.
1908. Werner, p. 1868.
1911c. Boulenger, p. 164.
1915d. Boulenger, p. 647.
1924b. Loveridge, p. 5.
1910c. *Simocephalus unicolor* Boulenger, Ann. Mag. Nat. Hist. (8), **5**, p. 512: Fort Hall, Kenya Colony.
1915c. Boulenger, p. 621.
1924b. Loveridge, p. 5.
1910. *Simocephalus poensis* Lepri (*non* Smith), p. 323.
1910. *Mehelya* (or *Simocephalus*) *lamani* Lönnberg, Arkiv. Zoöl., **7**, No. 8, p. 1: Mukimbungu, lower Congo River, Belgian Congo.
1910. *Mehelya* (*Simocephalus*) *chanleri* Lönnberg, p. 4.
1910. *Mehelya* (*Simocephalus*) *phyllopholis* Lönnberg, p. 4.
1910. *Mehelya* (*Simocephalus*) *butleri* Lönnberg, p. 4.
1927. Calabresi, p. 52.
1912c. *Mehelya baumanni* Sternfeld (*non* Sternfeld, 1908), p. 268.
1913. *Mehelya* (*Simocephalus*) *somaliensis* Lönnberg & Andersson, Arkiv. Zool., **8**, No. 20, p. 2: Kismayu, Italian Somaliland.
1915a. *Simocephalus lamani* Boulenger, p. 203.
1933m. Witte, p. 88.
1934a. Schwetz, p. 381.
1917. *Mehelya lamani* Sternfeld, p. 465.
1923. Schmidt, p. 71.
1929a. Werner, p. 56.
1928f. *Mehelya butleri* Loveridge, p. 4.
1929a. Werner, p. 55.
1929h. *Mehelya chanleri* Loveridge, p. 21
1929a. Werner, p. 56.
1935a. Corkhill, p. 15.
1936. Pitman, p. 271, pl. iv, fig. 5 and pl. D, fig. 1.
1929a. *Mehelya unicolor* Werner, p. 55.
1929a. *Mehelya plyllopholis* (sic) Werner, p. 55.
1929a. *Mehelya somaliensis* Werner, p. 56.
1933f. *Simocephalus Baumanni* Angel (part), p. 97.
1934a. *Simocephalus Guirali* Schwetz (*non* Mocquard), p. 381.
1936h. *Mehelya chanleri chanleri* Loveridge, p. 24.
1937f. Loveridge, p. 502.
1938a. Pitman, pp. 304, 328.
1937c. *Mehelya capensis* Loveridge (*non* Smith), p. 272.

Description. Rostral nearly twice as broad as deep, visible from above; internasals broader than long, half to seven-eighths the length of the prefrontals; frontal as long as, or slightly longer, or slightly shorter than broad, as long as, or slightly longer, or slightly shorter than its distance from the rostral, much shorter than the parietals; loreal squarish, usually slightly deeper than long, or longitudinally divided (*unicolor*), or entirely absent (*phyllopholis*); preoculars 1–2; eye moderate, larger than the nostril, its diameter greater than its distance from the mouth; postoculars 1–3, normally 2; temporals

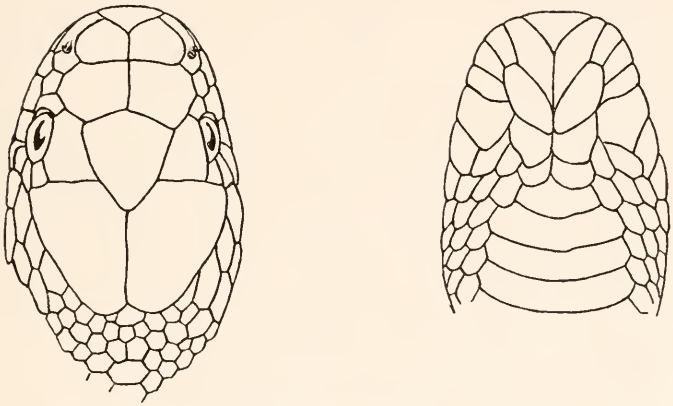

Fig. 1. *Mehelya capensis savorgnani* (Mocquard). Being the heretofore unfigured head of the type of *Simocephalus chanleri* Stejneger (U.S.N.M. 20126).

1+2, rarely 1+3; upper labials 7, the third and fourth (third, fourth and fifth on one side only of a Stanleyville snake) entering the orbit; 4–5 lower labials in contact with the anterior chin-shields which are longer than the posterior. Midbody scales in 15 (17–19 on neck) rows, strongly keeled with secondary keels and tubercles more or less developed; ventrals 218–239; anal entire; subcaudals 53–65 pairs.

Coloration. Above, black, slate, dark brown, violet-brown or olive-brown, either uniform or each scale with a light basal spot; below, uniform slate, grey, brown, or else yellowish, the outer ends of each ventral dark. (See also Pitman, 1936, p. 271 and pl. D, fig. 1.)

Measurements. Total length, ♀, 1403+ (1290+113+) mm., tail mutilated.

Diet. At Fort Hall a native encountered a large file snake swallowing a night adder (*Causus rhombeatus*); in killing the file snake, the man ruptured its gullet so that the head and forepart of the night

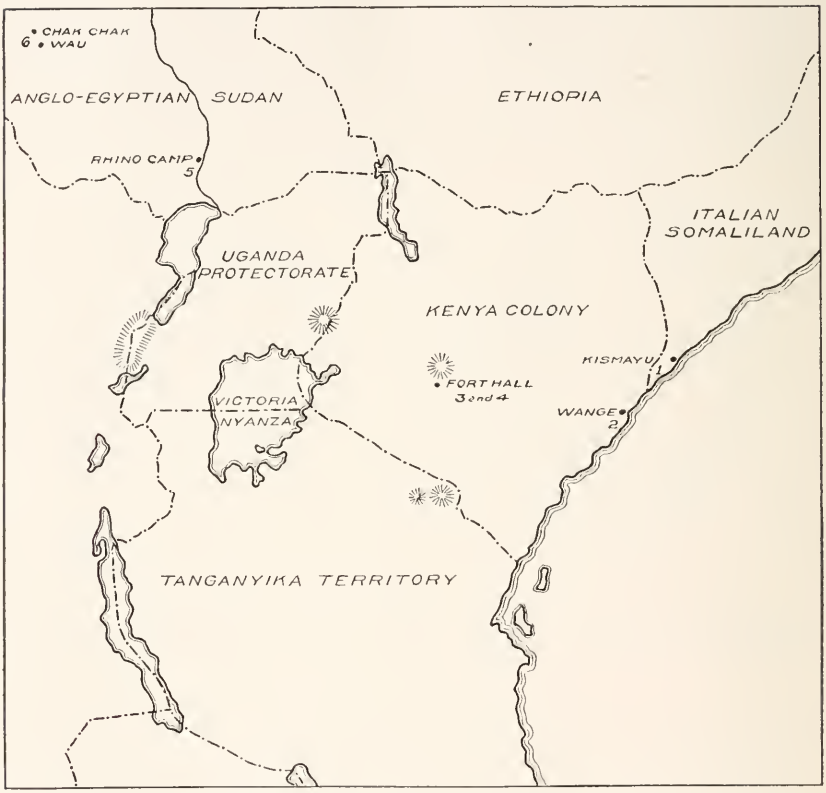

Fig. 2. Distribution of *Mehelya capensis savorgnani* in East Africa. Type localities of *somaliensis* (1), *chanleri* (2), *unicolor* (3), *butleri* (6) and second records of *butleri* (4) and *chanleri* (5).

adder protruded. Nine inches had already been swallowed, the total length of the prey being twenty-one inches. Pitman has recorded a Budongo specimen, over five feet long, which was killed in the act of swallowing a sand snake (*Psammophis*) far larger than itself, "which it appeared to be successfully digesting although about ten inches of

the victim's tail protruded from its mouth!" He says that frogs are also eaten by this species.

Parasites. Pitman states that ticks are harboured by this snake.

Distribution. Italian Somaliland — southern: Kismayu. *Kenya Colony:* Fort Hall; Lamu Island; Wange. *Uganda:* Budongo Forest; Bussu; Entebbe; Rhino Camp. *Anglo-Egyptian Sudan:* Chak-Chak to Wau; Dilling. *Cabinda:* Chinchoxo. *Belgian Congo:* Albertville; Avakubi; Buta; Congo River; Duma; Elisabethville; Kunungu; Medje; Mukimbungu; Niangara; Stanleyville; Vube. *French Congo:* Lambarene; Ogowe. *French Equatorial Africa:* Batangafo. *French Cameroon:* Sakbayeme. (Rochebrune's record of Senegambia is rejected.)

Mehelya capensis fiechteri Scortecci

1929c. *Mehelia* (*Simocephalus*) *fiechteri* Scortecci, Atti. Soc. Ital. Sci. Nat., **68**, p. 269, figs.: Duke of the Abruzzi's Villa, Italian Somaliland.
1936h. *Mehelya fiechteri* Loveridge, pp. 25–26.

Description. Rostral nearly twice as broad as deep, visible from above; internasals as broad as long, slightly shorter than the prefrontals; frontal slightly longer than broad, slightly longer than its distance from the rostral, much shorter than the parietals; supraoculars well developed; loreal squarish, entirely above the second upper labial; preocular 1; eye moderate, larger than the nostril, its diameter greater than its distance from the mouth; postoculars lacking (having fused with the supraocular and fourth labial); temporals 1+2; upper labials 7, the third and fourth entering the orbit; 5 lower labials in contact with the anterior chin-shields, which are longer than the posterior. Midbody scales in 15 rows, strongly keeled, with secondary keels present on all though best developed near the vertebral line; ventrals 221–225; anal entire; subcaudals 51–57 pairs.

Coloration. Above, uniform brown, except the lips which are greyish yellow; below, greyish yellow, on the anterior border of each ventral a more or less continuous greyish maroon stripe.

Measurements. Total length of ♀ type 465 (398+67) mm.

Distribution. Italian Somaliland: Villaggio Duca degli Abruzzi.

Remarks. The above description is based on the original, supplemented by data derived from the excellent drawings which accompany it and with the addition of essential scale-counts taken from the "Somaliland" specimen in the British Museum. Were it not for the existence of this second snake I should be inclined to synonymize

fiechteri with *M. c. savorgnani*. As, however, these two snakes agree in lacking postoculars—the only obvious character separating them from *savorgnani*—and constitute the two most northeasterly records of the species, it may be that a form has become differentiated north of Kismayu, where *savorgnani* occurs.

Mehelya capensis capensis (Smith)

1847. *Heterolepis capensis* A. Smith, Ill. Zoöl. S. Africa, Rept., pl. lv: Eastern parts of Cape Province, South Africa.
1854. Duméril & Bibron, p. 426.
1887h. Boulenger, p. 178.
1887a. Mocquard, p. 22.
1891e. Boulenger, p. 344.
1874. *Heterolepis Gueinzee* Peters, Monatsb. Akad. Wiss. Berlin, p. 163, pl. –, fig. 2: Port Natal, Natal.
1887h. Boulenger, p. 178.
1887a. Mocquard, p. 22.
1891e. Boulenger, p. 344.
1889. *Heterolepis bicarinatus* Pfeffer (*non* Duméril & Bibron), p. 9.
1893. *Simocephalus poensis* Pfeffer (*non* Smith), p. 86.
1896. Tornier, p. 69.
1897. Tornier, p. 65.
1893b. *Simocephalus capensis* Boulenger, p. 345.
1896d. Boulenger, p. 617.
1897d. Boulenger, p. 374.
1898. Sclater, p. 99.
1898. Werner, p. 413.
1900b. Boulenger, p. 452.
1907j. Boulenger, p. 486.
1908b. Boulenger, p. 228.
1908. Gough, p. 23.
1909. Chubb, p. 595.
1910b. Boulenger, p. 506.
1910a. Sternfeld, p. 17, fig. 15.
1910b. Sternfeld, p. 18, fig. 17.
1911b. Nieden, p. 442.
1912. FitzSimons, F. W., pp. 85, 96.
1913. Hewitt & Power, p. 162.
1915c. Boulenger, p. 621.
1917a. Phisalix, p. 335.
1919b. Boulenger, p. 280.
1923d. Angel, p. 166.
1931. Monard, p. 103.
1933f. Angel (part), p. 98.

1936. Cowles, p. 8.
1937a. FitzSimons, V., p. 262.
1937. Monard, p. 119.
1910. *Mehelya* (*Simocephalus*) *capensis* Lönnberg, p. 3.
1928c. *Mehelya capensis* Barbour & Loveridge, p. 114.
1929a. Werner, p. 55.
1937f. Loveridge, p. 502.

Corrigenda. Simocephalus capensis was reported in error for *M. crossii* by Chabanaud (1916f), but the majority of West African records of *capensis* will be found under *M. capensis savorgnani*.

Native names. Inyanda izulu (S. Rhodesia); *ganga* (Angola).

Description. Rostral nearly twice as broad as deep, visible from above; internasals slightly broader than long, two-thirds to seven-eighths the length of the prefrontals (which in one instance exhibited a tendency to divide); frontal as long as, or slightly longer, or slightly shorter than, broad, as long as, or slightly longer, or slightly shorter than, its distance from the rostral, usually much shorter than the parietals; loreal squarish; preoculars 1–2; eye moderate, larger than the nostril, its diameter greater than its distance from the mouth; postoculars 1–2; temporals 1+2; upper labials 7,[1] the third and fourth entering the orbit; 4–5 lower labials in contact with the anterior chin-shields which are longer than the posterior. Midbody scales in 15 (17–19 on neck) rows, strongly keeled with secondary keels and tubercles; ventrals 203–224 (241 for the type is rejected); anal entire; subcaudals 47–56 (64 for the type is rejected) pairs.

Coloration. Above, dark olive-brown or violet-brown, middle of vertebral scales white or yellowish; below, white or yellowish, the outer ends of each ventral dark.

Measurements. Total length, ♂, 1330+(1170+160+) mm. from Umvoti River, Natal (M.C.Z.).

Breeding. On November 19, 1926, a 1119 mm. female was found in loose soil and vegetable debris, among which was an old egg-shell, at the base of an *mvuli* tree in an open pasture at Amani. In her oviducts were six eggs, measuring 42 x 30 mm., which were ready for deposition.

Temperament. The species appears to be very docile both by day and when on the move at night. No resistance was made to capture and no attempt to bite was offered by two large examples.

[1] Smith's figure shows 8 upper labials, the fourth, fifth and sixth entering the orbit; as this contradicts the letterpress it must be assumed to be erroneous. I also doubt the count of 241 ventrals and 64 subcaudals which are beyond the probable range of variation. Unfortunately the type is lost.

Distribution. Tanganyika Territory: Usambara Mountains: Amani; Lewa; Misalae; Nguelo. *Zanzibar:* Kokotoni (This old Pfeffer record should be received with reservation pending confirmation, in view of the fact that the collector, Stuhlmann, was also in the Usambaras). *Mozambique:* Beira; Delagoa Bay. *Nyasaland:* Zomba. *Southern Rhodesia:* Bulawayo; Filabusi; Salisbury. *Bechuanaland Protectorate:* Mochudi. Natal: Durban (Port Natal); Umvoti River mouth; Umzumbe Valley. *Cape Province:* Eastern parts.[1] *Angola:* Ganguellas River; Vila de Ponte.

Mehelya poensis (Smith)

1847. *Heterolepis poensis* A. Smith, Ill. Zoöl. S. Africa, Rept., footnote to pl. lv: Fernando Po.
1874. Reichenow, p. 292.
1875a. Peters, p. 200.
1889. Boettger (part), p. 279.
1891e. Boulenger, p. 346.
1895c. Bocage, p. 13.
1905. Ferreira, p. 168.
1854. *Heterolepis bicarinatus* Duméril & Bibron, Erpét. Gén., **7**, p. 422: Coast of Guinea.
1863. Jan, p. 98.
1870. Jan, livre 36, pl. vi, fig. 5.
1886. Martinez y Saez, p. 339.
1887a. Mocquard, p. 19, pl. i, figs. 2–2a.
1858. *Simocephalus poensis* Günther, p. 194.
1863. Günther, p. 360.
1873b. Bocage, p. 218.
1884a. Rochebrune, p. 183.
1884b. Sauvage, p. 201.
1893b. Boulenger, p. 346.
1893c. Matschie, p. 211.
1897. Sjöstedt, p. 24.
1898. Werner, p. 208.
1899a. Werner, p. 137.
1902a. Werner, p. 344.
1903a. Bocage, p. 43.
1906i. Boulenger, p. 212.
1908a. Sternfeld, pp. 406, 424.
1908b. Sternfeld, pp. 213, 229.
1909. Peracca, p. 172.

[1]Dr. Hewitt writes me (11. xi. 1927) that he has no material but regards a record from Bedford (H. James) as worthy of acceptance though the snake was not preserved.

1909b. Sternfeld, p. 14, fig. 16.
1910. Muller, p. 600.
1911c. Boulenger, p. 164.
1911. Lampe, p. 190.
1915a. Boulenger, p. 203.
1915c. Boulenger, p. 621.
1916f. Chabanaud, p. 369.
1919b. Boulenger, p. 280.
1919g. Boulenger, p. 22.
1921a. Chabanaud, p. 468.
1922. Aylmer, p. 15.
1924b. Loveridge, p. 5.
1927d. Witte, p. 322.
1933f. Angel, p. 100, figs. 35–35a.
1934a. Schwetz, p. 381.
1903. *Grobbenia poensis* Poche, p. 699.
1910. *Mehelya (Simocephalus) poensis* Lönnberg, p. 3.
1912c. *Mehelya poensis* Sternfeld, p. 199.
1917. Sternfeld, p. 467.
1923. Schmidt, p. 72, pl. vi.
1929. Werner, p. 55.
1936. Pitman, p. 272, pl. iv, fig. 6 and pl. D, fig. 2.
1937f. Loveridge, p. 502.
1938d. Loveridge, p. 57.
1938a. Pitman, p. 328.

Corrigenda. Heterolepis bicarinatus was reported in error for *M. c. savorgnani* by Bocage (1866a), for *guirali* by Sauvage (1884a), for *M. c. capensis* by Pfeffer (1889). Part of Boettger's (1889) material of *Heterolepis poensis* is referable to *M. guirali. Simocephalus poensis* was reported in error for *M. c. capensis* by Pfeffer (1893) and Tornier (1896, 1897), in error for *M. c. savorgnani* by Lepri (1910).

Description. Rostral nearly twice as broad as deep, just visible from above; internasals as broad as, or broader than, long, half to three-quarters the length of the prefrontals; frontal a little longer than broad, as long as, or slightly longer, or slightly shorter, than its distance from the rostral, much shorter than the parietals; loreal as long as, or slightly longer than, deep (see remarks below); preocular 1; eye moderate, larger than the nostril, its diameter greater than its distance from the mouth; postoculars 2, very rarely 3; temporals 1+2; upper labials 7, very rarely 8, the third and fourth, or rarely the fourth and fifth, entering the orbit; 4–5 lower labials in contact with the anterior chin-shields, which are slightly longer than the posterior. Midbody scales in 15 (17–19 on neck) rows, strongly keeled, secondary

keels feebly marked or absent; ventrals 240–256 (239–262 *fide* Angel); anal entire; subcaudals 96–124 (Smith's type had 67 subcaudals, but it was subsequently shown that its tail was truncated; possibly this is also the case with the snake listed by Boulenger as having 85 subcaudals; he later gave the range as 75–124 but as no 75 has appeared in the literature it may be a misprint for 85) pairs.

Coloration. Above, uniform blackish, greyish, or pale brown, or each scale edged with lighter; below, white or yellowish, the outer ends of each ventral dark.

Measurements. Total length 1200 (980+220) mm.

Diet. The stomach of the type of *bicarinatus,* as well as those of a Molundu and a Ganta snake, held skinks (*Mabuya blandingii* and *sp.*). That of another Ganta snake held two large agamas (*Agama a. savatieri*), and Mr. Parker informs me that the "*Cordylus*" lizard, recorded by Günther as present in the stomach of a Calabar specimen, is a somewhat digested *Agama* also.

Habitat. Beneath the bark of a dead tree at Zoubourouma; in grass at Stanleyville; in a plantation at Gamangui.

Distribution. Uganda: Budongo Forest; Bussu; Mitiana. *Angola:* Cazengo: Cabicula. *Cabinda. Belgian Congo:* Avakubi; Gamangui; Koloka; Makaia Ntete; Medje; Molundu; Nala; Stanleyville; Uptoto. *French Congo:* Fernand Vaz; Isongo. *Spanish Guinea:* Elobey Island. *Fernando Po:* San Carlos. *French Cameroon:* Bipindi; Bonamandune; Bonge; Campo; Jossplatte; Longji (Lonji); Mundame; Jaunde (Yaunde). *British Cameroon:* Bibundi; Deidodorf; Jabassi. *Nigeria. Togoland. Gold Coast. Liberia:* Ganta. *Sierra Leone. French Guinea:* Zoubourouma. (Rochebrune's record of Senegambia is rejected).

Remarks. Boulenger's (1919g) suggestion that Sternfeld's (1912c) record of *baumanni* should be referred to *poensis* was incorrect; its subcaudal count of 65 shows that it is referable to *M. c. savorgnani.*

Sternfeld (1917) records a snake from Molundu in which the loreal is separated from the preocular (on the right side of the head only) by the prefrontal forming a suture with the third upper labial.

Mehelya stenophthalmus (Mocquard)

1887a. *Heterolepis stenophthalmus* Mocquard, Bull. Soc. Philom. Paris (7), **11**, p. 16, pl. i, figs. 1–1b: Assini, Gold Coast and Cape Lopez, French Congo.

1896a. Bocage, p. 77.

1893b. *Simocephalus stenophthalmus* Boulenger, p. 347.

1908a. Sternfeld, pp. 407, 424.

1908b. Sternfeld, pp. 213, 229.
1909b. Sternfeld, p. 14.
1910. Müller, p. 600.
1911. Lampe, p. 190.
1919b. Boulenger, p. 281.
1924b. Werner, p. 31.
1933f. Angel, p. 99.
1911a. *Gonionotophis microps* Boulenger, Ann. Mag. Nat. Hist. (8), **8**, p. 370: Bitye, French Cameroon.
1919b. Boulenger, p. 279.
1924b. Werner, p. 31.
1927d. Witte, p. 322.
1929a. Werner, p. 53.
1933m. Witte, p. 88.
1929a. *Mehelya stenophthalmus* Werner, p. 54.

Description. Rostral once and a half as broad as deep, just visible from above; internasals broader than long, two-thirds the length of the prefrontal; frontal as long as broad, as long as its distance from the rostral, much shorter than the parietals; loreal as long as deep or usually slightly longer, rarely absent through fusion with the preocular; preocular 1; eye small, scarcely larger than the nostril, its diameter less than its distance from the mouth; postoculars 1–2; temporals 1+2; upper labials 7, the third and fourth entering the orbit; 4–5 lower labials in contact with the anterior chin-shields, which are slightly longer than the posterior. Midbody scales in 15 (19 on neck) rows, faintly keeled, a short secondary keel on either side of the median one apically, present or absent; ventrals 198–214 (228 *fide* Sternfeld); anal entire; subcaudals 47–60 pairs.

Coloration. Above, uniform dark purplish brown, olive, or blackish; below, yellowish, the outer ends of each ventral dark, subcaudals dusky, their posterior edges lighter.

Measurements. Total length 700 (590+110) mm. See remarks below.

Diet. The stomach of one of the cotypes of *mierops* held a snake of the same species.

Distribution. Belgian Congo: Makaia Ntete. *French Congo:* Cape Lopez; Isongo. *French Cameroon:* Bipindi; Bitye; Dibongo. *British Cameroon:* Bibundi. *Togoland. Gold Coast:* Assini. *Portuguese Guinea:* Bissau.

Remarks. The greatest length given above is that of one of Mocquard's cotypes, still the largest example known. Boulenger (1893b, p. 347) quoted this erroneously as: Total length 590 mm., tail 110 mm.

Mehelya nyassae (Günther)

1888b. *Simocephalus nyassae* Günther, Ann. Mag. Nat. Hist. (6), **1**, p. 328: Lake Nyasa, Nyasaland.
1891a. Boulenger, p. 306.
1893b. Boulenger, p. 347, pl. xxiii, fig. 2.
1899. Sclater, p. 99.
1908. Gough, p. 23.
1910b. Boulenger, p. 506.
1910. Lönnberg, p. 3.
1910a. Sternfeld, p. 17.
1912. FitzSimons, F. W., p. 85.
1915c. Boulenger, p. 622.
1923e. Loveridge, p. 878.
1924b. Loveridge, p. 5.
1896a. *Heterolepis nyassae* Bocage, p. 91.
1906a. *Gonionotophis degrijsi* Werner, Zoöl. Anz., **30**, p. 53: Usambara Mountains, Tanganyika Territory.
1909d. Werner, p. 217.
1929a. *Mehelya nyassae* Werner, p. 55.
1936j. Loveridge, p. 243.
1937f. Loveridge, pp. 493, 496.

Description. Rostral nearly twice as broad as deep, just visible from above; internasals broader than long, half to two-thirds the length of the prefrontals; frontal as long as, or slightly longer than, broad, as long as, or shorter than, its distance from the rostral, much shorter than the parietals, twice as broad as a supraocular; loreal once and a half to twice as long as deep; preoculars 1–2; eye moderate, larger than the nostril, its diameter less than its distance from the mouth; postocular 1; temporals 1+2; upper labials 7, the third and fourth entering the orbit, the fifth sometimes touching the parietals; 5 lower labials in contact with the anterior chin-shields, which are longer than the posterior. Midbody scales in 15 (17–19 on neck) rows, strongly keeled, except the outer row which is feebly keeled, with a pair of secondary keels at the apex on either side of the median one; ventrals 171–178; anal entire; subcaudals 55–63 pairs.

Coloration. Above, uniform slate, blackish brown or dark brown; below, paler, brownish, yellowish olive or white, the outer ends of each ventral faintly like the dorsum.

Measurements. Total length of ♀, a cotype of *degrijsi*, 576 (460+116) mm.

Breeding. On June 13, at Wema, the oviducts of a ♀ held three eggs, each measuring 10 x 4 mm.

Defence. A Nyasa File Snake, on being struck, emitted a most foul odor, far surpassing that of the European Grass Snake.

Habitat. One was taken in a termite hill at Lumbo, another in grass on the banks of the Tana River.

Distribution. Belgian Ruanda-Urundi: between Lakes Kivu and Tanganyika. *Kenya Colony:* Ngatana: Wema. *Tanganyika Territory:* Usambara Mountains. *Zanzibar. Mozambique:* Delagoa Bay; Lumbo. *Nyasaland:* Lake Nyasa. *Transvaal:* Leydsdorp. *Natal:* Durban.

Remarks. It was Boulenger (1915c) who synonymized *G. degrijsi* with *S. nyassae*, an action at which Werner (1909d) protested, despite the fact that the scale formula of his third specimen was identical with that of the type of *nyassae*. At my request Mr. Parker has kindly reëxamined the type of *nyassae*, and states that its dentition is very distinctly that of a *Mehelya*.

In addition to its dental differences *Mehelya nyassae* appears to differ from *Gonionotophis grantii* of the West Coast chiefly in having more strongly keeled scales, the outer row obtusely keeled (smooth in *grantii*), and in possessing fewer subcaudals.

Genus Gonionotophis

1889. *Gonionotus* Mocquard (*non* Gray), Bull. Soc. Philom. Paris (8), **1**, p. 146 (type *brussauxi*).

1893b. *Gonionotophis* Boulenger, Cat. Snakes Brit. Mus., **1**, p. 323 (n.n. for *Gonionotus* Mocquard, preoccupied).

1916f. *Cephalosimus* Chabanaud, Bull. Mus. Paris, **23**, p. 369 (type *insignis* =*brussauxi* of new subgenus of Simocephalus Günther).

Maxillary and dentary bones angularly bent inwards anteriorly; maxillary teeth 25 to 30, anterior slightly longer but forming a *continuous series* with the posterior; maxillary processes distinct and widely separated; external process of palatine bone on the posterior half, or in centre, of the palatine, in contact with, but not overlapping the anterior maxillary process; *no internal palatine process;* palatine teeth 14–15; pterygoid teeth about 40. Head scarcely distinct from neck, much depressed; eye small, with vertically elliptic pupil; nostril large. Body cylindrical, scales more or less keeled and with traces of a pair of secondary keels on the apical region of each scale often present, without apical pits, in 15–21 rows, at midbody, those of the vertebral series enlarged and bicarinate; ventrals less than 190, rounded. Tail moderate; subcaudals in two rows. Hypapophyses developed throughout the vertebral column.

Range. West Africa from the French Congo to Portuguese Guinea.

Remarks. I am indebted to Mr. H. W. Parker for all the anatomical additions to Boulenger's definition which are contained in the above description of the genus.

Synopsis of the Species

Midbody scales in 21 rows.
Ventrals 169–180; subcaudals 73–92.
(Portuguese Guinea to French Congo) ..... *brussauxi* (p. 150)

Midbody scales in 19 rows.
Ventrals 167–173; subcaudals 90–94.
(Togoland) ..... *klingi* (p. 151)

Midbody scales in 15 rows.
Ventrals 162–178; subcaudals 62–67; lowest lateral scale-row smooth.
(Portuguese Guinea to French Cameroon) ..... *grantii* (p. 152)

Gonionotophis brussauxi (Mocquard)

1889. *Godionotus* (*sic*) *Brussauxi* Mocquard, Bull. Soc. Philom. Paris (8), **1**, p. 146, pl. ii: Between Ludinia and Niari Rivers, French Congo.
1891e. *Gonyonotus Brussauxi* Boulenger, p. 345.
1893b. *Gonionotophis brussauxi* Boulenger, p. 323.
1895a. Bocage, p. 83.
1897b. Mocquard, p. 13.
1900b. Boulenger, p. 452.
1915a. Boulenger, p. 203.
1919b. Boulenger, p. 279.
1929a. Werner, p. 53.
1933f. Angel, p. 78.
1892b. *Gonionotus vossi* Boettger, Zoöl. Anz., **15**, p. 418: Cameroon.
1893b. *Gonionotophis vossii* Boulenger, p. 323.
1897. Sjöstedt, p. 35.
1898. Boettger, p. 35.
1898. Werner, p. 208.
1906i. Boulenger, p. 212.
1908a. Sternfeld, pp. 404, 422.
1908b. Sternfeld (part), pp. 211, 228.
1909b. Sternfeld, p. 11, figs. 13–13a.
1909d. Werner, p. 217.
1910. Müller, p. 596.
1915a. Boulenger, p. 203.

1922a. Mertens, p. 179.

1916f. *Simocephalus insignis* Chabanaud, Bull. Mus. Paris, **22**, p. 369, figs. 10–11: Ogowe, French Congo.

Description. Rostral once and a half to twice as broad as deep, just visible from above; internasals very short, much broader than long; prefrontals as long as, or longer than, broad; frontal as long as, or shorter than, broad, as long as its distance from the rostral or end of snout, much shorter than the parietals; supraocular very small; loreal more than twice as long as deep; no preocular, the loreal and prefrontal entering the orbit; eye moderate, larger than the nostril, its diameter slightly greater than its distance from the mouth; postoculars 2; temporals 1+2 or 2+2; upper labials 8, the fourth and fifth entering the orbit; 4–5 lower labials in contact with the anterior chin-shields, which are longer than the posterior. Midbody scales in 21 (23–27 on neck) rows, rugose and strongly keeled, secondary keels not distinct; ventrals 169–180 (185 *fide* Boulenger); anal entire; subcaudals 73–92 (95 *fide* Boulenger) pairs.

Coloration. Above, uniformly blackish brown or brown, the scales edged with lighter; below, and on the lips, clear brownish yellow or dirty yellow.

Measurements. Total length of type of *vossi*, 454 (344+110) mm.

Distribution. French Congo: Lambarene; Ludinia-Niara Rivers; Ogowe. *French Cameroon:* Bipindi; Bitye; Campo; Dehane; Dibonga; Efulen; Kribi; Mukonje farm, Mundame; Pungo Songo. *British Cameroon:* Bibundi; Victoria. *Portuguese Guinea:* Rio Cassine.

Remarks. Mocquard (1897b, p. 13), on reëxamining the type of *brussauxi*, concludes that the vertebral series is sharply bicarinate throughout and that *vossi* cannot be considered distinct. Boulenger (1919b, p. 279) suggests that *insignis*, which was based on a very young snake with unhealed umbilici, is a synonym of *brussauxi*. This suggestion was later stated to be correct by Angel (1933f, p. 7).

Gonionotophis klingi Matschie

1893b. *Gonionotophis klingi* Matschie, Sitz. Ges. Naturf. Freunde Berlin, p. 172: Bismarckburg, Togo.

1893c. Matschie, p. 211.

1896d. Boulenger, p. 614.

1902a. Werner, p. 338.

1919b. Boulenger, p. 279.

1933f. Angel, p. 78.

1908b. *Gonionotophis vossii* Sternfeld (part, *non* Boettger), pp. 211, 228.

Description. Rostral just visible from above; internasals broader than long; prefrontal slightly longer than broad; frontal as long as its distance from the rostral, shorter than the parietals; supraocular small; loreal twice as long as deep; preocular 0, rarely 1 (as in type and on one side of head in Atakpame snake); postoculars 2; temporals 1+2 or 2+2; upper labials 8 (not 7, *fide* Werner), the fourth and fifth entering the orbit; 5 lower labials in contact with the anterior chinshields, which are longer than the posterior. Midbody scales in 19 rows, keeled; ventrals 167–173; anal entire; subcaudals 90–94 pairs.

Coloration. Above blackish brown, the scales edged with lighter; below, yellowish.

Measurements. Total length of type, 420 (295+125) mm.

Distribution. Togoland: Atakpame; Bismarckburg.

Remarks. Apparently only differs from *brussauxi* in having 19 midbody scale-rows instead of 21. Sternfeld (1908b, p. 211) synonymized *klingi* with *rossi* (i.e. *brussauxi*) on this account, but the fact remains that all five known Togo snakes have had only 19 rows in opposition to those from elsewhere.

Gonionotophis grantii (Günther)

1863. *Simocephalus Grantii* Günther, Ann. Mag. Nat. Hist. (3), **12**, p. 360, pl. v, fig. F: West Africa.
1873b. Bocage, p. 220.
1884a. Rochebrune, p. 183.
1887a. Mocquard, p. 13.
1891e. Boulenger, p. 345.
1891e. *Gonyonotus Grantii* Boulenger, p. 345.
1893b. *Gonionotophis grantii* Boulenger, p. 324, pl. xxiii, fig. 1.
1895a. Bocage, p. 84.
1901b. Werner, p. 636.
1908b. Sternfeld, pp. 212, 228.
1919b. Boulenger, p. 279.
1929a. Werner, p. 53.
1933f. Angel, p. 77, fig. 27.
1910d. *Simocephalus rostralis* Sternfeld, Mitt. Zoöl. Mus. Berlin, **5**, p. 63: Cameroon.
1919b. Boulenger, p. 280.
1929a. Werner, p. 55.

Description. Rostral nearly twice as broad as deep, just visible from above; internasals broader than long, half the length of the prefrontals; frontal as long as broad, as long as its distance from the rostral, much shorter than the parietals; supraocular very small;

loreal twice as long as deep; preocular 1; eye moderate, larger than the nostril, its diameter about equal to its distance from the mouth; postoculars 1–2; temporals 1+2; upper labials 7, the third and fourth entering the orbit, the fifth sometimes in contact with the parietal; 5 lower labials in contact with the anterior chin-shields, which are longer than the posterior. Midbody scales in 15 (19 on neck) rows, rather feebly keeled, not rugose except outer row which is smooth; ventrals 162–178; anal entire; subcaudals 62–67 pairs.

Coloration. Above, blackish brown, the scales edged with lighter; below, yellowish, sometimes a brown line beneath the tail.

Measurements. Total length of ♀, 495 (390+105) mm.

Distribution. Cameroon (*rostralis* type). *Togoland. Gold Coast. French Guinea:* Kouroussa. *Portuguese Guinea:* Bissao. (Rochebrune's Senegambia record is rejected pending confirmation).

Remarks. The types of *grantii* were males, that of *rostralis* apparently a female, differing only from the range of variation of *grantii* in possessing seven more ventrals and five fewer subcaudals.

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THE MILLIPEDS COLLECTED IN APPALACHIAN CAVES BY MR. KENNETH DEAROLF

BY H. F. LOOMIS
Bureau of Plant Industry
U. S. Department of Agriculture

CAMBRIDGE, MASS., U.S.A.
PRINTED FOR THE MUSEUM
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PUBLICATIONS

OF THE

MUSEUM OF COMPARATIVE ZOÖLOGY

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No. 4.— *The Millipeds Collected in Appalachian Caves by Mr. Kenneth Dearolf*

By H. F. Loomis

In the years 1935 to 1938, Mr. Kenneth Dearolf, Wyomissing Hills, West Lawn, Pennsylvania, gathered one of the most extensive collections of invertebrates from caves that has been made in this country, over 60 caves in seven Eastern States, four in Texas and five in Missouri, having been visited in the project. A description of collecting methods and summarized results have been reported by him[1], while the animals themselves were turned over to specialists for detailed study. He has since published a list of the molluscs and myriapods found in the Pennsylvania caves he visited[2].

The millipeds from the Eastern collection were sent for identification to the U. S. Bureau of Entomology, Washington, D. C., and by them kindly forwarded to me. The Mid-western material, composed of five species from nine caves, was sent direct to me by Mr. Dearolf. The Eastern material came from 37 caves and included 24 identifiable species and several others which, through lack of sufficient specimens, were referable only to genera. Not more than three species of millipeds were found in any one cave, as the following list of the Eastern caves and their respective milliped inhabitants shows, but it will be seen that several species were quite widely distributed.

Pennsylvania

1. Aitkin Cave, Mifflin County: *Conotyla vaga* Loomis.
2. Brownstone Cave, Dauphin County: *Conotyla vaga* Loomis; *Polydesmus moniliaris* (Koch); *Oxidus gracilis* (Koch).
3. Dragon Cave, Berks County: *Contyla vaga* Loomis; *Scytonotus granulatus* (Say), possibly from Schofer Cave, Berks County.
4. Lisburn Cave, York County: *Polydesmus hortus* Wms. & Hef.
5. Merkle Cave, Berks County: *Conotyla vaga* Loomis; *Polydesmus sp.*
6. Schofer Cave, Berks County: *Conotyla vaga* Loomis; *Polydesmus serratus* Say; *Scytonotus granulatus* (Say), possibly from Dragon Cave, Berks County.
7. South Temple Cave, Berks County: *Conotyla vaga* Loomis.
8. Upper Johnson Cave, Mifflin County: *Conotyla vaga* Loomis.

[1] Proc. Penn. Acad. Sci., pp. 42 – 47, vol. 11, 1937.
[2] Proc. Penn. Acad. Sci., pp. 64 – 67, vol. 12, 1938.

Maryland

9. Crystal Grottoes, Boonsboro: *Conotyla vaga* Loomis.

Virginia

10. Cassel Farm Cave, Burks Garden: *Pseudotremia tuberculata* Loomis.
11. Endless Caverns, New Market: *Zygonopus whitei* Ryder.
12. Lawson Cave, Burks Garden: *Pseudotremia sp.; Brachydesmus pallidus* Loomis.
13. Shenandoah Caverns, New Market: *Zygonopus whitei* Ryder.

West Virginia

14. Arbuckle Cave, Maxwelton: *Pseudotremia sp.*
15. Eagle Cave: *Pseudotremia princeps* Loomis.
16. Higginbotham Cave, Frankford: *Pseudotremia sp.*
17. Lakeland Cave, Charleston: *Paraiulus impressus* (Say); *Brachydesmus pallidus* Loomis.
18. Seneca Caverns, Pendleton County: *Dearolfia luseiosa* Loomis; *Zygonopus whitei* Ryder.
19. Simmon's Cave, Cave: *Pseudotremia simulans* Loomis; *Zygonopus whitei* Ryder.
20. Smoke Hole Cave, Pendleton County: *Pseudotremia princeps* Loomis.
21. Trout Rock Cave, Pendleton County: *Zygonopus whitei* Ryder.

Kentucky

22. Bat Cave, Carter County: *Pseudotremia sodalis* Loomis.
23. Cascade Cave, Carter: *Pseudotremia carernarum* Cope.
24. Cedar Sinks, Cave City: *Apheloria coriacea* (Koch).
25. Great Onyx Cave, Cave City: *Scoterpes copei* (Packard).
26. Laurel Cave, Carter: *Cambala cristula* Loomis; *Pseudotremia carterensis* Bollman.
27. Mammoth Cave, Cave City: *Scoterpes copei* (Packard).
28. White's Cave, Cave City: *Scoterpes copei* (Packard); *Chaetaspis albus* Bollman.

Tennessee

29. Crystal Cave, Monteagle: *Spirostrephon lactarium* (Say).
30. English Cave, Harrowgate: *Pseudotremia nodosa* Loomis.
31. Indian Cave: *Cambala cristula* Loomis.
32. Lookout Mountain Cave, Chattanooga: *Pseudotremia sp.*

33. Nickajack Cave, Shell Mound: *Cambala cristula* Loomis; *Arctobolus marginatus* (Say).
34. Wonder Cave, Monteagle: *Pseudotremia sp.; Scoterpes copei* (Packard).

Georgia

35. Creek Bed Cave, Rising Fawn: *Pseudotremia sp.; Polydesmus sp.*
36. Cricket Cave, Rising Fawn: *Pseudotremia eburnea* Loomis.
37. Saw Mill Cave, Rising Fawn: *Scoterpes copei* (Packard).

The majority of the species in this collection are typical surface humus inhabitants which may have been only casual visitants in the caves where they were found, but a definite statement cannot be made, for in small caves or in the entrances of the larger ones, conditions may be not only acceptable to surface species but, by their constancy, may be even more attractive than the conditions in the surface humus, where fluctuations of temperature and moisture are far greater. Relatively few millipeds are completely cavernicolous, and probably not more than half a dozen species in the present collection fall in this class. Characters, such as lack of color; reduction or loss of the eyes; lengthening of the appendages; and reduction of body size and chitinization, which in insects are associated with restricted cave life, are not always safe criteria of a cave existence in the millipeds, for these characters may be found, not too infrequently, in species that live in the surface humus, conditions there being near enough to those found in caves that such characters may develop or at least are not suppressed. In this collection are several previously described species, which, like those here described for the first time, have never been found outside of caves. This, however, probably indicates that the interiors of the caves have been more carefully searched than the surface of the ground adjacent to their mouths. It is quite certain that the wide distribution of *Conotyla vaga*, for instance, which was found in seven of the eight Pennsylvania caves containing millipeds, and in one in Maryland, could have come about only through surface migration.

The most remarkable single feature of the collection is the unexpected abundance of species of *Pseudotremia*, a genus which has suddenly been increased from two species by the addition of six new ones. The discovery of a new species of the genus Tingupa, far to the east of the previously known range, also is noteworthy.

In studying the Chordeumoid millipeds in this collection, Attems'

paper in Kükenthall's Handbuch der Zoologie, Vol. 4, 1926, was referred to and several taxonomic points were found that appear to need correction. On page 156 *Trachysomidae* Verhoeff 1913 must be replaced by *Trachygonidae* Cook 1896, as Cook observed that *Trachysoma* Attems was preoccupied and suggested *Trachygona* and *Trachygonidae* for the genus and family. On page 160 credit for *Conotylidae* should be Cook 1896 instead of Verhoeff 1909. On page 167 *Verhoeffiidae* should be changed to *Haplogonidae* (new name) as Cook, Brandtia, p. 7, 1896, stated that *Haplogona* had priority over *Verhoeffia*. On page 170 *Pseudocleididae* Attems 1899, containing the genus *Cleidogona*, must be replaced by the earlier name *Cleidogonidae* Cook 1896.

Type specimens of the species described in this paper are deposited in the Museum of Comparative Zoology, Cambridge, Mass. Paratype males, where available, have been deposited in the U. S. National Museum.

Paraiulus impressus (Say)

Two young females, Lakeland Cave, Charleston, W. Va., Sept. 2, 1937.

Spirostrephon lactarium (Say)

A male, Crystal Cave, Monteagle, Tenn., June 30, 1937. A female, probably of this species from Rubidoux Cave, Waynesville, Mo., June 8, 1938.

Cambala cristula Loomis

A male, Laurel Cave, Carter, Ky., June 25, 1937; two specimens, Aug. 30, 1935, and many specimens, July 1, 1937, from Nickajack Cave, Shell Mound, Tenn.; several immature specimens, Indian Cave, Tenn., Aug. 31, 1935.

Arctobolus marginatus (Say)

A male, Nickajack Cave, Shell Mound, Tenn., July 1, 1937.

Pseudotremia princeps spec. nov.

Several broken specimens of both sexes, Smoke Hole Cave, Pendleton Co., W. Va., April 20, 1935; from Eagle Cave, W. Va., a male and female, April 22, 1935, and two males (one the type) and a female, June 1, 1935.

Diagnosis. Not only is this the largest member of the genus but it exceeds in size any other species of the suborder Chordeumoidea in North America. Dorsum less extensively and more faintly tuberculate than in any of the larger species recognized and with more prominent raised lateral shoulders. The chief differences, however, are found in the gonopods.

Description. Largest male 31 mm. long, largest female 34 mm. long; body more fusiform than shown in illustration of *P. cavernarum* by Cook & Collins (Ann. N. Y. Acad. Sci. pl. 1, fig. 11, vol. 9, 1895).

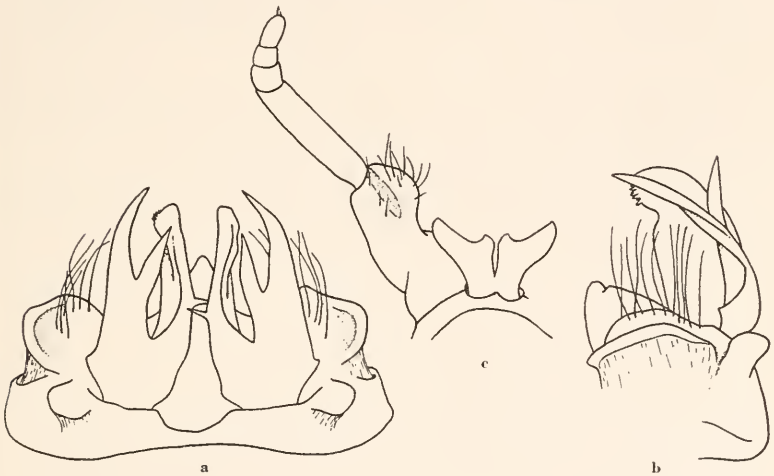

Fig. 1. *Pseudotremia princeps.* *a*, Gonopods, anterior view; *b*, Gonopod, outer lateral view; *c*, Ninth leg and bifid laminae of gonopods, posterior view.

Color in alcohol bluish slate-gray, probably much as in life, the metazonites darker than the prozonites and with a large, transverse, oval or reniform, light maculate area extending inward from each shoulder, a similar area on each side of the prozonite approaches nearer the colorless median line.

Ocelli well pigmented, 20-22 in number, arranged in quite definite vertical series parallel the back of the head: 6–5–4–3–1–1, counting forward.

First segment with each lateral angle prominently thickened; shoulder of second segment conspicuous, thick, the shoulders of segments 3 and 4 slightly thicker but those of segments 5, 6, and 7 suddenly

much more so, thereafter decreasing in size and not evident behind segment 20; shoulders of segments 3, 4, and 5 strongly elevated above the level of the side of the dorsum. First five segments entirely smooth on the dorsum, or at most with very faint longitudinal surface irregularities on either side of segments 4 and 5, but with no tubercles; from segment 6 caudad a few faint elongate swellings scarcely worthy the name of tubercles are present on the sides of the dorsum but nowhere approach closer to the median line of the segment than the inner seta; last five or six segments not tuberculate, the foremost of these segments with the surface faintly impressed lengthwise behind the setae; lateral striae conspicuous on the anterior half of body, becoming weaker thereafter and absent from the last four segments.

Gonopods as shown in figure 1, a, b, and c.

Males with a spongy pad, bordered by fine hairs, on the inferior face of the last joint of the legs from those in front of the gonopods to within five or six pairs of the back end of the body.

Ninth male legs 5-jointed (Fig. 1, c.).

Eleventh male legs with the process on the posterior face of each coxa large, conic.

Pseudotremia simulans spec. nov.

A young female collected June 1, 1935, a broken male (type), and several young collected July 5, 1937, in Simmon's Cave, Cave, W. Va.

Diagnosis. Outwardly closely resembling *princeps* but the tuberculation of the dorsum is a little more prominent, the lateral shoulders are evident further back on the body; and the gonopods are materially different.

Description. Body of the same shape, color and almost as large as *princeps.*

Ocelli 17–18, mostly irregularly placed, only the five closest to the back margin of the head forming a vertical row.

Anterior segments with lateral shoulders as in *princeps,* those of segments 3–5 similarly elevated; on the posterior segments lateral shoulders faintly evident to the antepenultimate segment. Tuberculation of the dorsum distributed as in *princeps* but somewhat more prominent, being composed of oval or elongate ridge-like tubercles quite sharply defined and present as far caudad as segment 25 behind which the posterior half of the metazonites is longitudinally rugose or faintly ridged.

Gonopods and ninth legs as shown in figure 2, a and b, the ninth legs 5-jointed.

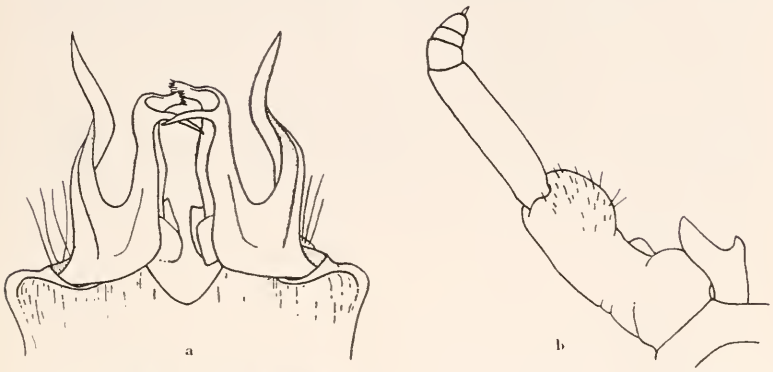

Fig. 2. *Pseudotremia simulans*. *a*, Gonopods, anterior view; *b*, Ninth leg and bifid lamina of gonopod, posterior view.

Process on the posterior face of each coxa of the eleventh male legs large, conic.

Distal joint of male legs with subtarsal pads as in *princeps*.

Pseudotremia carterensis Bollman

Several females, apparently of this species, Laurel Cave, Carter Ky., June 25, 1937.

Pseudotremia tuberculata spec. nov.

A single broken male from Cassel Farm Cave, Burks Garden, Va., July 3, 1937.

Diagnosis. A more generally tuberculate species than any other here described and probably even more so than *carterensis;* the anterior gonopods are strikingly different from those of the other species, and the posterior portions, the bifid laminae, show definite thickening.

Description. Length about 27 mm; body very fusiform, the first three segments narrow, segments 4, 5, and 6 broadening rapidly, 7 and 8 less rapidly, after which the sides converge to the narrow last segment. Color as in *princeps*.

Ocelli about 19, in quite definite oblique-vertical series.

First segment with each lateral angle small, scarcely projecting and little thickened; shoulders of segment 2 faint, those of segments 3, 4, 5, and 6 increasing in size gradually, slightly projecting, thickened but not elevated, thereafter decreasing in size and not apparent after segment 20; dorsal sculpturing coarser and more general than in any species here described, the tubercles oval, almost none elongate or ridge-like; dorsal tubercles first evident on the sides of the fourth or fifth segment, and strongly developed to segment 24, faint on segment 25, and lacking from the last five segments; they reach the middle of

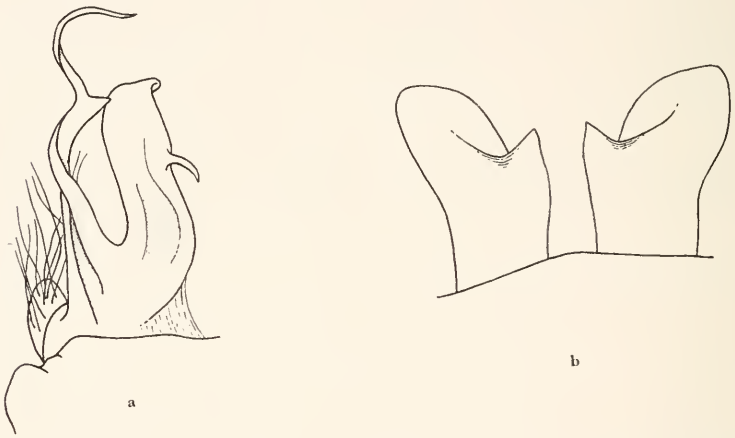

Fig. 3. *Pseudotremia tuberculata*. *a*, Left gonopod, anterior view; *b*, Bifid laminae of gonopods, posterior view.

the dorsum from segment 12 backward but are not as large or well defined as near the sides; lateral striae strong on anterior segments and continuing, although very faintly, to the antepenultimate segment.

Gonopods as shown in figure 3, a and b; the bifid laminate plates thicker than in any other species.

Males with subtarsal pads present on the legs to near the posterior end of the body.

Ninth male legs 4-jointed, the basal joint thinner at apex than in the other species.

Eleventh male legs with process on the posterior face of each coxa greatly reduced in size, very small, conical.

Pseudotremia cavernarum Cope

A half dozen immature specimens appearing to belong to this species collected in Cascade Cave, Carter, Ky., June 24, 1937.

Pseudotremia sodalis spec. nov.

Two males (one the type) and two young specimens collected in Bat Cave, Carter Co., Ky., June 25, 1937.

Diagnosis. This species was collected in one of the caves from which *carterensis* was originally described, and appears more closely related

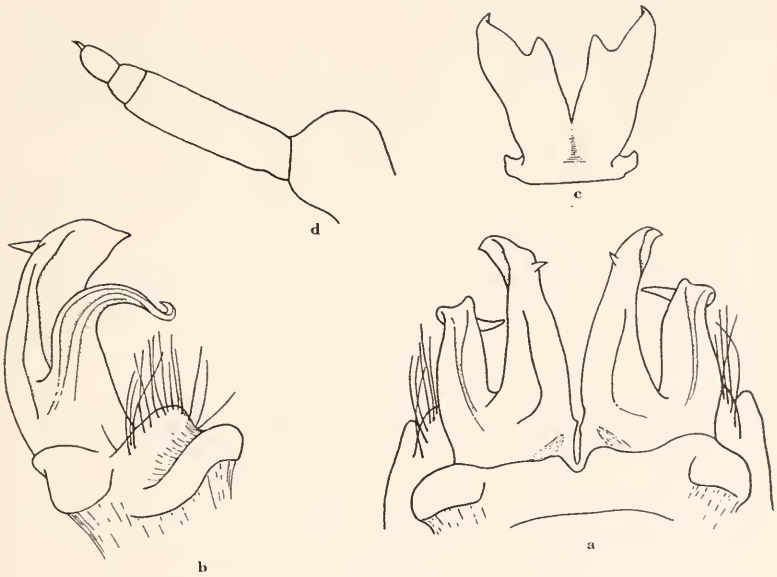

Fig. 4. *Pseudotremia sodalis.* *a*, Gonopods, anterior view; *b*, Gonopod, outer lateral view; *c*, Bifid laminae of gonopods, posterior view; *d*, Ninth leg of male.

to it than to the other species but differs in the much smaller body and peculiarities of the gonopods; the latter also obviously distinct from the other species.

Description. Body of male 15–16 mm long, nearly as small as the unpigmented and peculiarly tuberculate *nodosa;* body scarcely fusiform,

quite like *carterensis*, the sides in front of the last few segments nearly parallel.

Color similar in shade and distribution to that in *princeps*.

Eyes composed of 18–20 subequal ocelli compactly arranged in a sub-triangular group, sometimes in rather definite series.

First segment with lateral angles small, inconspicuous; lateral shoulders of segment 2 barely indicated, those of segments 3–6 increasing in size but not attaining the development found in *princeps* or *simulans* and not at all elevated, shoulders disappearing on the posterior segments as in the other species; dorsal tubercles numerous, small, low, elongate-oval and not sharply defined, beginning on the sides of segment 6 and attaining the middle of the dorsum at about segment 15 and thereafter continuous on the posterior part of the metazonites to segment 24 or 25, the last five or six segments lacking tubercles other than those bearing the setae and these rising from slight depressions of the surface; lateral striae pronounced to segment 25, faint on 26, and absent from the last four segments.

Gonopods as shown in figure 4, a, b, and c.

Males with scabrous subtarsal pads on legs to near caudal end of body.

Ninth male legs 4-jointed (Fig. 4, d).

Process on the posterior face of the coxae of the eleventh male legs large and subconic.

Pseudotremia eburnea spec. nov.

A mature male (type) and one with 28 segments collected in Cricket Cave, Rising Fawn, Ga., August 30, 1935.

Diagnosis. Distinguished from the other unpigmented species, *nodosa*, by the more general dorsal tuberculation, slightly larger size and the structure of the gonopods.

Description. Body small, 19 mm long; not fusiform; segments 1 and 2 of equal width, narrow; segments 3 to 7 widening gradually and uniformly instead of having 5 and 6 suddenly widened as is general in other species; from segment 8 caudad the body is nearly parallel sided to the last five segments which narrow abruptly. Color of living animal probably almost white, the alcoholic specimens stained, light brown.

Eyes composed of about 12 unpigmented ocelli.

First segment with each lateral angle small, scarcely thickened; second segment with almost no indication of lateral shoulders; segments 3–6 with swollen shoulders increasing in prominence but not

elevated or approaching the development of those in *princeps;* shoulders of ensuing segments decreasing and obliterated a short distance behind the middle of the body. Lateral striae evident on all except segments 1 and 30, those on segments 28 and 29 very faint. Segments with a few rather large, indefinite, rounded tubercles first evident at the sides of segment 5 and continuing to about the fourth from the last segment; on the segments behind the middle of the body the tubercles approach almost to the median line.

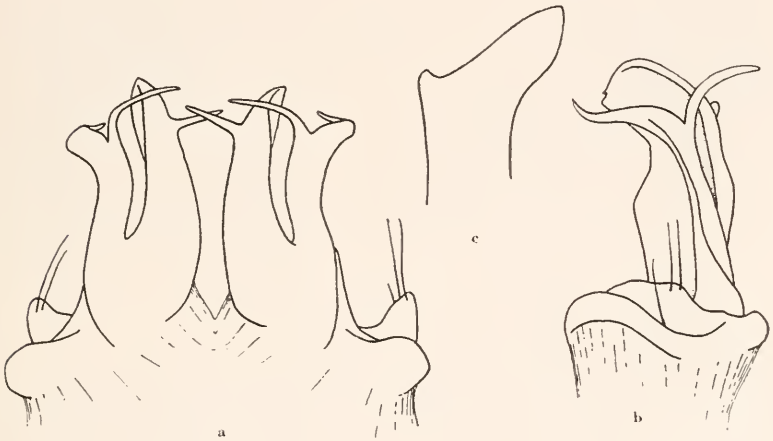

Fig. 5. *Pseudotremia eburnea. a,* Gonopods, anterior view; *b,* Gonopod, outer lateral view; *c,* Bifid lamina of gonopod, posterior view.

Gonopods as shown in figure 5, a, b, and c.

In the male, legs 3–7 are crassate and have ventral pads on the outer joint but behind the gonopods the legs are more slender and lack tarsal pads; ninth legs 4-jointed; a prominent teat-like tubercle on the posterior face of each coxa of the eleventh legs.

Pseudotremia nodosa spec. nov.

A broken male (type), a female and several young from English Cave, Harrowgate, Tenn., July 2, 1937.

Diagnosis. The small size coupled with the unpigmented, nearly parallel-sided body, especially of the female; and lack of dorsal tuber-

cles except at the back margin of the segments, where they are unusually prominent, distinguish this species from other known forms.

Description. The smallest member of the genus, the female 17 mm long, the broken male about 15 mm long; body of the female widening gradually and evenly from the first to the seventh segment, the male with the first five segments widening gradually but segment 6 suddenly increased in width; body of both sexes parallel-sided from segment 8 to segment 22 or 23, thereafter narrowing gradually to the relatively

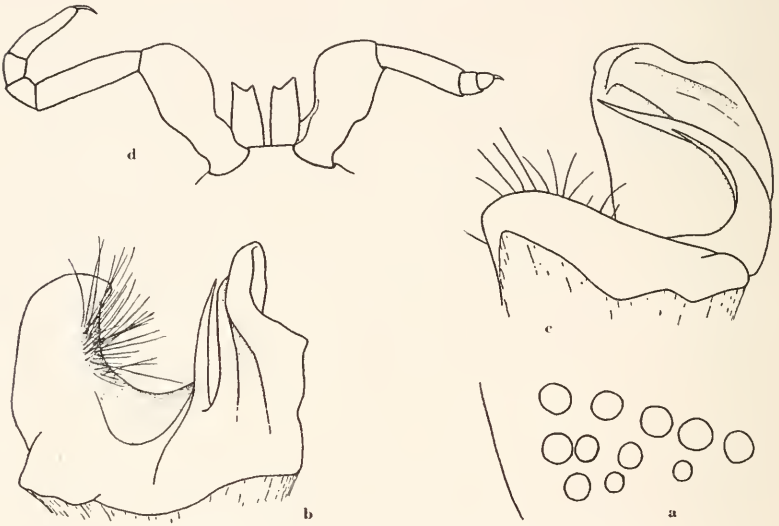

Fig. 6. *Pseudotremia nodosa*. *a*, Back margin of head and ocelli; *b*, Left gonopod, anterior view; *c*, Left gonopod, outer lateral view; *d*, Sternum, ninth legs and bifid laminae of gonopods, posterior view.

broad last segment; lateral carinae more reduced than in other species, only faintly indicated as slight swellings of the anterior segments in the female, a little more prominent in the male but not developed as much as in *eburnea* where almost a minimum is reached; lateral striae fine; in the male extending over half way to the lateral shoulder on the anterior segments and not evident on the last eight or ten segments; in the female only three or four striae are obvious on the anterior segments and are faintly indicated on midbody segments but lacking on the posterior segments.

Body unpigmented, white in alcohol; the 8–11 ocelli black or dark brown, variable in size and arrangement as shown in figure 6, a.

Dorsal sculpture of segments restricted, anterior part of metazonite smooth and shining except for the small tubercles supporting the setae, a series of 10–12 equidistant, large, sharply raised, nodular tubercles along the posterior margin beginning with segment 5 or 6 and extending to segment 25 or 26, several smaller tubercles sometimes are scattered just in advance of the marginal series.

Gonopods as shown in figure 6, b, c, and d, the ninth legs in d, four-jointed on one side of the body with the two outer joints reduced in size, the other leg is five-jointed with the three outer joints quite like those of normal legs.

Male legs in front of the gonopods slender but with a pad beneath the last joint, the legs following the gonopods also slender but without tarsal pads.

Male legs 10 and 11 with a prominent lobe at the disto-mesial angle of the coxae; eleventh legs with a long, slenderly conical process on the posterior face of the coxae.

Pseudotremia spp.

Female or immature specimens, probably representing three or four species but definitely assignable to none, collected from the following localities: three young, from Creek Bed Cave, Rising Fawn, Ga., August 30, 1935; one young, from Lookout Mountain Cave, Chattanooga, Tenn., July 1, 1937; a female, Wonder Cave, Monteagle, Tenn., June 30, 1937; a female, Lawson Cave, Burks Garden, Va., July 3, 1937; two females, Higgenbotham Cave, Frankford, W. Va., July 4, 1937; three females, Arbuckle Cave, Maxwelton, W. Va., July 4, 1937.

Dearolfia gen. nov.

Type. D. lusciosa spec. nov.

Diagnosis. The position of this genus is between *Pseudotremia* and *Cleidogona*, having the form but not the sculpturing, and the eye development resembling the former genus, while the gonopods resemble those of *Cleidogona*, but the sternum between the twelfth male legs lacks the process characteristic of that genus and the ninth legs are only 3-jointed.

Description. Body of medium size, slender, fusiform, narrowing

caudad from segment 7 or 8; dorsum smooth, without tubercles except the small ones supporting the dorsal setae.

Ocelli small, few in number, unpigmented; antennae long and very slender, even surpassing those of *Pseudotremia.*

First segment somewhat longer than that of *Cleidogona;* subreniform, very broadly rounded in front and somewhat emarginate at middle behind; second segment as wide as segment 1, the two much narrower than the head; segments 3 and 4 gradually wider; segments 5, 6, and 7 suddenly increasing in width, the latter wider than any other segment, those thereafter very gradually decreasing in width to the posterior end of the body; lateral shoulders present on the anterior segments as rounded swellings about as prominent as in *Pseudotremia;* lateral striae coarse and few in number.

Sternal plates with a pronounced median carina abruptly elevated.

Gonopods resembling those of *Cleidogona,* lacking the pair of bifid laminae found in *Pseudotremia.*

In the male the first and second legs are reduced in size; legs 3–7 a little thickened, the outer joint with a ventral granular pad not present on the legs following the gonopods; ninth legs 3-jointed, terminating in a claw; legs 10 and 11 with coxal pouches, the latter coxae with processes on the posterior face similar to those in *Pseudotremia;* sternum between the twelfth legs similar to those ensuing.

Dearolfia lusciosa spec. nov.

The male type, a female, and two nearly mature specimens from Seneca Caverns, Pendleton Co., W. Va., June 1, 1935; a male and two immature specimens from the same cavern, April 21, 1935.

Description. Length 17–18 mm; color white.

Eye cluster much smaller than the antennal socket, composed of 4–7 unpigmented ocelli no larger than the organ of Tömösvary, which is intermediate in position between the eye and the antenna as shown in figure 7, a; antennae long and very slender, joint 3 longest, joints 2–5 quite suddenly thickened distally (Fig. 7, b).

Head and first two segments shown in dorsal view in figure 7, *c;* segments 1 and 2 with lateral shoulders faintly indicated, those of segment 4 of moderate size and on segments 5–7 they suddenly become prominent as rounded swellings which slowly decrease in size on succeeding segments and are not evident on the posterior half of the body; on the anterior segments six or seven coarse lateral striae are present reaching not more than half way to the lateral shoulder, on ensuing segments the

striae are restricted in prominence, number, and extent, and are absent from the last few segments.

Gonopods as shown in figure 7, d and e.

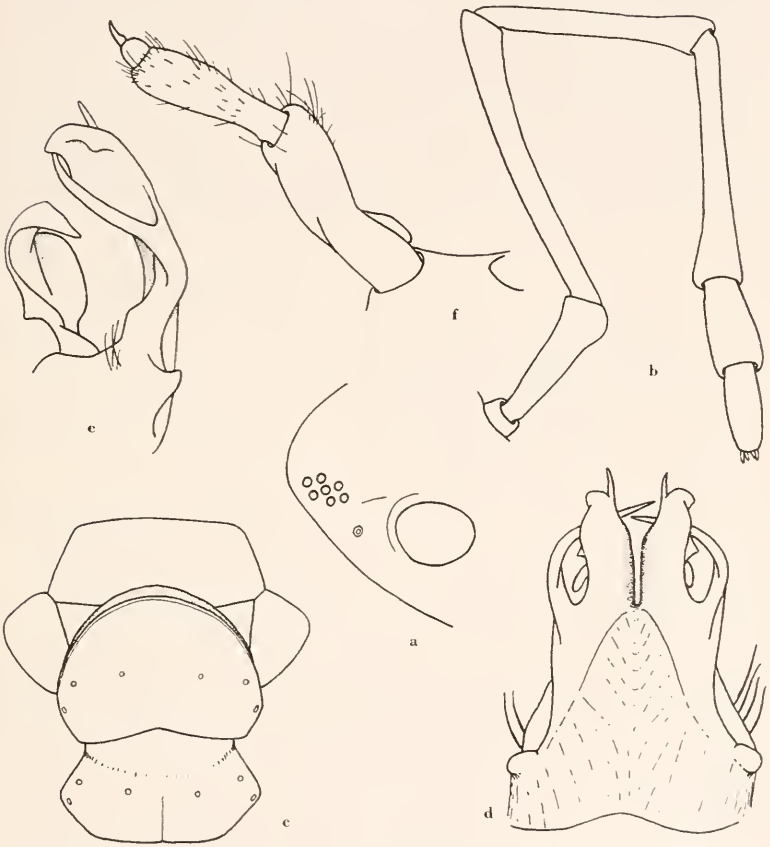

Fig. 7. *Dearolfia lusciosa.* *a*, Side of head showing ocelli, organ of Tomosvary and antennal socket; *b*, Antenna; *c*, Head and first two segments, dorsal view; *d*, Gonopods, anterior view; *e*, Gonopod, lateral view; *f*, Sternum and ninth male leg, posterior view.

Ninth male legs as shown in figure 7, f; the coxae of the eleventh legs each with an elongate conic process on the posterior face.

Scoterpes copei (Packard)

A male, Whites Cave, Cave City, Ky., June 29, 1937; a single female from each of the following: Mammoth Cave, Cave City, Ky., June 26, 1937; Great Onyx Cave, Cave City, Ky., August 22, 1935; Saw Mill Cave, Rising Fawn, Ga., August 30, 1935; several females, Wonder Cave, Monteagle, Tenn., June 30, 1937.

New characters or some which have been in doubt since the species was described are given below:

Length about 8 mm. Lateral shoulders more prominent than those of *Zygonopus*, the dorsal setae much longer, equal the diameter of the

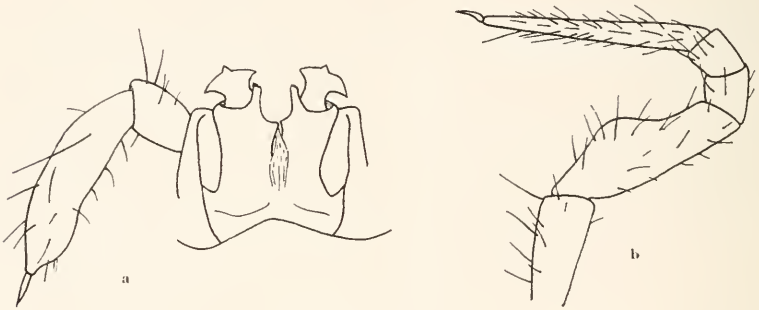

Fig. 8. *Scoterpes copei*. *a*, Gonopods and ninth leg, anterior view; *b*, Five outer joints of sixth male leg.

body and borne on larger tubercles, the median ones smaller than those on the sides.

Antennae long and slender, the fifth joint distinctly longer than the third; joint 6 slightly thicker than any other, exceeded in length by the last joint.

First segment with three equidistant setae on either side in a straight oblique row extending inward and forward from the posterior corner, the rows separated in front by a distance equal the length of a row; similar straight, oblique, widely spaced rows of setae are on ensuing segments, the posterior or outermost seta borne on the lateral shoulder.

Legs longer and more slender than those of *Zygonopus*, the last joint longer than joint 4 which, however, considerably exceeds it in thickness. Anterior male legs slender (somewhat crassate in *Zygonopus*), the

sixth pair having the fourth joint swollen along the ventral face (Fig. 8, a); other pregenital legs normal; ninth legs 2-jointed and ending in a strong, straight claw.

Gonopods and ninth legs as shown in figure 8, b.

Scoterpes dendropus spec. nov.

Six specimens, including the male type, collected in Marvel Cave, Mo., June 27, 1938.

Diagnosis. A larger species than *S. copei* with distinctive gonopods.

Description. Size relatively large; length of largest specimen, a male, 11 mm; body tapering toward both ends; colorless.

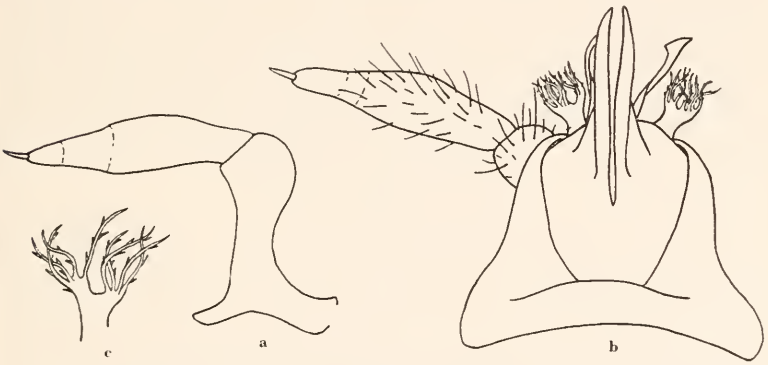

Fig. 9. *Scoterpes dendropus. a*, Ninth leg of male, posterior view; *b*, Gonopods and ninth leg of another specimen, anterior view; *c*, Apex of posterior branch of gonopod.

Head large, almost twice as wide as the first segment; cheeks and vertex strongly inflated; antennae long and slender, joint 5 definitely exceeding joint 3 in length; gnathochilarium with a large triangular mentum but no promentum.

First segment semi-circular, three-fifths as long as wide, posterior margin slightly emarginate at middle, the three setae on each side on small, sharply raised, equidistant tubercles in a straight row beginning near the posterior corner and extending forward and inward, the two rows separated by a distance equal to the length of one row; on ensuing segments the rows also are oblique and gradually become separated

to a distance double the length of a row but on the caudal segments the median space lessens and on segments 28 and 29 the six tubercles are equidistant from each other along the posterior margin; from segment 2 to near the last segments the tubercles surmount an oblique swelling or crest most prominent at the outer tubercle where a distinct shoulder is formed; all setae nearly erect, the ones on the last segments as well as those farther forward, the outer seta of each row slightly longer than the inner ones, about three-fourths the diameter of the body.

Preanal scale shaped like a broadly truncated triangle.

First and second male legs with a comb of stiff hairs ventrally; ensuing pregenital legs slightly more crassate than those of the female but without other specializations; ninth male legs variable, definitely two-jointed in some specimens or indefinitely three- or four-jointed, the leg on one side of the body often differing from that on the opposite side; indefinitely four-jointed legs are shown in figure 9, a and b, in which the two outer joints are of dissimilar length in the two specimens.

Gonopods as shown in figure 9, b, the outer posterior branch dendritic, ending in numerous spiny, tentacle-like branches, (Fig. 9, c), which often are partially imbedded in an accumulation of extraneous organic matter.

Zygonopus whitei Ryder

A female, Simmon's Cave, Cave, W. Va., June 1, 1935; several females, Seneca Caverns, Pendleton Co., W. Va., and Trout Rock Cave, Pendleton Co., W. Va., June 1, 1935; a male and female collected in Shenandoah Caverns, New Market, Va., August 30, 1937; two females, Endless Caverns, New Market, Va., August 31, 1937.

This species has not been reported since Cook and Collins' record of a specimen collected by L. M. Underwood in Luray Cave, Va., in September, 1887.[1]

The dorsal setae are considerably shorter than those of *Scoterpes* and are in a forwardly bowed row on each side of the dorsum rather than in a straight oblique line as in that genus and the tubercles supporting the setae are smaller. The lateral shoulders of the segments are less conspicuous than in *Scoterpes*.

Conotyla vaga spec. nov.

The male type and many other specimens collected in South Temple Cave, Berks Co., Pa., April 28, 1935. Additional specimens collected

[1] Ann. N. Y., Acad. Sci., pp 59–62, illus., Vol. 9, 1895.

elsewhere in Pennsylvania as follows: Schofer Cave, Berks Co., April 28, 1935, June 5, 1935; Dragon Cave, Berks Co., April 28, June 5, August 3, 1935, July 22, 1938; Merkle Cave, Berks Co., Sept. 25, 1935; Aitkin Cave, Mifflin Co., Nov. 28, Dec. 12, 1936; Jan. 1, April 4, 1937; Brownstone Cave, Dauphin Co., Jan. 16, 1937; Upper Johnson Cave, Mifflin Co., Jan. 23, 1937; Crystal Grottoes, Boonesboro, Md., Sept. 2, 1937.

Diagnosis. Closely related to *C. bollmani*, from which it is indistinguishable in many features and into which it may eventually have

Fig. 10. *Conotyla vaga*. Gonopod and ninth leg, anterior view.

to be withdrawn, but the body is slightly smaller, the dorsum smooth and shining and the processes on the joints of anterior male legs differently arranged.

Description. Body 13–16 mm. long, shaped as in *bollmani* but the dorsal surface smooth and shining, not in the least minutely hispid.

Ocelli 19–23 in four horizontal rows, the upper one containing the most ocelli.

Gonopods (Fig. 10) differing in a few minor particulars from those of *bollmani* as illustrated by Cook and Collins, Ann. N. Y. Acad. Sci., pl. 5, fig. 79, Vol. 9, 1895.

Fourth male legs with the fourth joint simple, not equipped with a fungiform tubercle on the inner face, but such a tubercle projects from the posterior side, near the base, of the fourth joint of the seventh legs, where none is described for *bollmani*.

Conotyla specus spec. nov.

A score of specimens, including the male type, taken from insect trap in Rice's Cave, three miles northeast of Goldman, Jefferson Co., Mo., Oct. 16, 1938, by Leslie Hubricht of the Missouri Botanic Garden. An immature and a mature male and female were collected by Kenneth Dearolf, June 7, 1938 in Fisher Cave, Meramec State Park, Mo.

Fig. 11. *Conotyla specus.* *a*, Fourth male leg, anterior view; *b*, Gonopods and ninth leg, anterior view; *c*, Gonopod, outer lateral view.

Diagnosis. This is the smallest species of the genus thus far known with the exception of *C. glomerata* (Harger) and *C. wyandotte* (Bollman) both of which were based on females and later were more or less empirically placed in the genus *Conotyla*, where they have been allowed to remain pending discovery and study of males. The present species differs from them at least in the number and disposition of the ocelli.

Description. Maximum length 13 mm. Metazonites with rather irregular dark pigmentation, the prozonites with little, but the color of both obviously affected by the preservative.

Ocelli 21–23, in a quadrangular rather than triangular patch.

Segments with the humeral swellings distinct but not especially strongly projecting; preanal scale semi-circular behind or even a little more sharply rounded.

Males with first and second legs normal but for a comb of stiff hairs beneath the last joint; third and fourth legs with a relatively long digitate lobe on the ventral side of joint 4 at middle, that of the fourth leg largest (Fig. 11, a); joints 3 and 4 of these two pairs of legs stouter than the same joint of the adjacent legs; fifth, sixth, and seventh legs with granulations beneath the outer joint as on the third and fourth legs but without other specializations; tenth legs with the process on the anterior face of each coxa prominent, knob-like, the basal portion slightly constricted; eleventh and twelfth legs normal.

Gonopods and ninth legs as shown in figure 11, b and c.

Tingupa pallida spec. nov.

Two entire specimens, one the male type, and five broken ones collected in River Cave, Hahatunka, Mo., June 8, 1938.

Diagnosis. The light color; small size of the body; comparative lengths of antennal joints 3 and 5; reduced number of ocelli; and the structure of the gonopods are characters distinguishing this species from those already described.

Description. Body without pigmentation, the ocelli dark brown or black; length 5 to 6 mm.

Head with vertex sharply rounded but without surface modifications except evenly scattered erect setae similar to those elsewhere on the surface but less abundant; ocelli 8 to 12 in number, arranged in two to four horizontal rows, usually a single ocellus uppermost below which the ocelli may be arranged in rows as follows: 5, 4, 2; 5, 4; 5, 3 or 5, 2; one specimen has an eye composed of 10 ocelli, six above and four below; antennae moderately slender, the third joint definitely longer than the fifth which exceeds all others in width (Fig. 12, a).

Segments with dorsal sculpture as described for the genus, composed of many tiny, short, longitudinal crests without definite arrangement; dorsal setae slightly clavate, one projecting backward and outward from the margin just mesad of the posterior corner of the lateral keel; the other two setae on each side are directed upward and inwards, one from a broad depression at the anterior junction of the lateral keel with the body, the innermost seta from near the anterior margin of the metazonite half way between the second seta and the median line of the segment; lateral keels thick, distinctly bent forward on all but

eight or ten of the last segments, the outer margin rounded in outline, granular; segment 27 with keels suddenly reduced in size, those of segment 28 almost obsolete, entirely lacking from segment 29; posterior end of body gradually narrowing to the truncate apex of the last segment.

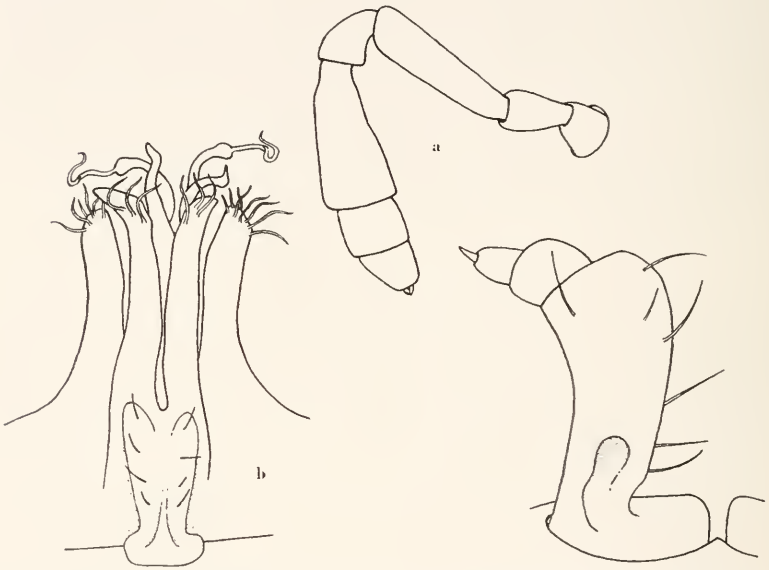

Fig. 12. *Tingupa pallida*. *a*, Antenna; *b*, Gonopods, *in situ*, vertical view; *c*, Ninth leg of male, anterior view.

Gonopods as shown in figure 12, b; they are held horizontally outside the body and project back between the coxae of the ninth legs and cover those of the tenth pair.

Ninth male legs three-jointed and with a tiny claw as shown in figure 12, c; the basal joint L-shaped with a long transverse basal portion from the outer part of which arises an upright shaft supporting the two small terminal joints, the erect shaft excavated on the front face at base.

Legs in front of the gonopods slightly more crassate than those of the female but otherwise unmodified.[1]

[1] It seems desirable to report the collection of *Striaria columbiana* Cook in Allen's Cave, Front Royal, Va., July 3, 1938, by H. S. Barber, U. S. Bureau of Entomology, Washington, D. C.

Polydesmus hortus Wms. & Hef.

A single male, Lisburn Cave, York County, Penn., Jan. 16, 1937.

Polydesmus moniliaris (Koch)

A young male, Brownstone Cave, Dauphin County, Penn., Sept. 3, 1937.

Polydesmus serratus Say

A female, Schofer Cave, Berks County, Penn., April 28, 1935.

Polydesmus sp.

A male, Creek Bed Cave, Rising Fawn, Ga., August 30, 1935.

This species is quite close to, if not identical with, *P. americanus* Carl but the gonopods show minor variations which may exclude it from that species when further study of sufficiently large suites of specimens allows appraisal of the constancy of these differences.

Polydesmus sp.

Fragments of two specimens, Merkle Cave, Berks Co., Pa., Aug. 25, 1938.

Speodesmus gen. nov.

Type. S. echinourus spec. nov.

Diagnosis. This tiny cave milliped, while having the general outlines of other polydesmids, has several striking generic differences. The dorsum of the segments lacks swollen, quadrate areas, or a transverse furrow, and there are more seta-bearing tubercles in each of the three transverse series than is customary. Most noteworthy character and extreme departure, however, is the peculiar preanal scale with its numerous long setae. The coxal joints of the gonopods also are unusually large.

Description. Body colorless, small, slender, delicate; number of segments 20.

Head subglobular, wider than segment one; vertex evenly inflated, with a fine, distinct median sulcus; surface with minute short scattered setae except on the posterior half of the vertex which is glabrous; an-

tennae long and slender; joint 6 with a sensory organ on the upper side near apex.

First segment semicircular, the posterior margin straight across; a series of small seta-bearing tubercles just behind the front margin, a similar series across the middle of the segment and another at the posterior margin.

Second segment equalling the head in width and wider than segments 1, 3, or 4, the outer margin of the keels longer than on the next two segments and with six or seven more or less distinct teeth; this and succeeding segments with three transverse rows of setiferous tubercles, those of the posterior row projecting slightly beyond the back margin; outer margin of the keels of segments 3 to 18 with five distinct teeth, including the produced posterior corner of the segment; surface of segments smooth between the tubercles, the dorsum with a very shallow, indefinite, transverse depression between the first and second row of tubercles; pores in normal sequence, opening on the dorsum at the base of the produced posterior corner of the carina; penultimate segment with lateral keels much smaller than on the foregoing segment, the posterior angles much less produced; last segment conical, with a short decurved mucro, dorsal setae apparently not in definite arrangement; anal valves strongly and evenly inflated, the inner margins thinly elevated; preanal scale the shape of a truncated triangle, the surface and margin of the apical half with a dozen or more tubercles each bearing a long stiff seta.

Legs long and slender, the terminal joint much exceeding the others in length; joints 2, 3, and 4 of the males with nodular granulations below. Gonopods with basal joint large and swollen, the terminal joint horizontal, curving inward, instead of being vertical and curving away from the body as in *Polydesmus*.

Speodesmus echinourus spec. nov.

Ten specimens, including the male type, from Prassel Ranch Cave, Kerrville, Texas, June 17, 1938, numerous other specimens from Schneider Cave and Cascade Cave, Boerne, Texas, June 17 and 18, 1938, and a single female from Ezell's Cave, San Marcos, Texas, June 21, 1938.

Description. Size small, 10 to 11 mm long; slender; white or colorless, with the dark median ganglion showing through the integument of the middle and last segments; shape resembling that of other small polydesmids.

Head subglobular; the vertex evenly inflated and with a fine impressed sulcus; surface sparsely hispid except at the back of the vertex;

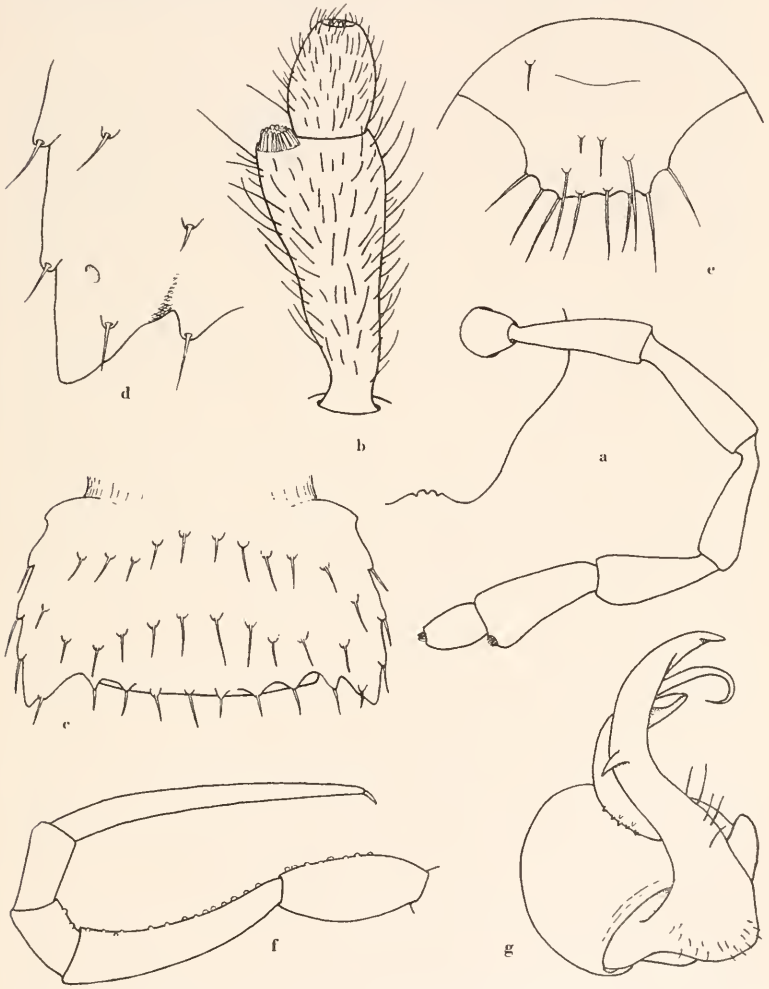

Fig. 13. *Speodesmus echinourus*. *a*, Part of head, with antenna, anterior view; *b*, Joints 6 and 7 of antenna; *c*, Segment 8; *d*, Posterior corner of segment 10, with pore; *e*, Preanal scale; *f*, Joints 2 to 6 of male leg from middle of body; *g*, Left gonopod, vertical view.

antennae (Fig. 13, a) slender, long, capable of extending back over the dorsum nearly to the posterior border of segment 4; joints 2, 3, 4, and 6 subequal, 5 slightly shorter; joint 6 widest and with a rounded area of densely crowded sensory hairs or papillae on the upper side near the apex (Fig. 13, b).

First segment narrower than the head, semicircular, the posterior corners suddenly bent but scarcely forming a right angle; on the lateral margin a little in advance of each corner is a small broadly angular tooth; extending to the lateral tooth on each side a series of 14 setiferous tubercles parallels the adjacent front margin; a second series of eight setae crosses the median part of the segment and another similar series just in advance of the posterior margin.

Second segment broader than segments 1, 3, or 4, and longer than the two latter, the outer margin of each keel with five to seven small dentations the last of which is the scarcely produced posterior corner, several of these teeth support a stiff seta; dorsally the segment is crossed by three series of small setiferous tubercles, eight to ten tubercles in each series.

Segments 3 to 18 with three transverse series of setiferous tubercles as on segment 2 (Fig. 13, c), and beginning with segment 6 the first two rows strongly bowed forward at middle, the third row usually somewhat projecting beyond the posterior margin; lateral keels of segments 3 and 4 with four marginal teeth, the ensuing keels with five teeth; surface of dorsum smooth between the seried tubercles and without longitudinal or transverse sulci although there is a broad, shallow indefinite depression between the first and second row of tubercles; on the side of segment 2 adjacent to the base of the legs is a small two- or three-toothed crest which increases in size on segments 3 and 4 and thereafter decreases but may be evident as far back as segment 15; segment 19 shorter and narrower than segment 18, the keels smaller, less distinctly toothed and the tubercles of the dorsum almost obsolete, the posterior row set considerably in front of the margin; last segment conical, with short deflexed mucro, posterior half of dorsum with 12 or more setae rising from minute tubercles; pores on segments 5, 7, 9, 10, 12, 13, 15–19, superior, opening from near the base of the produced hind angle (Fig. 13, d).

Anal valves strongly and evenly inflated, the margins thinly raised. Preanal scale as shown in figure 13, e.

Legs moderately long and slender, first or coxal joint small; joint 2 heavy, tapering to both ends from the middle; ensuing joints more slender, the sixth joint longest and slenderest, followed in length by

joint 3; in the male, joints 2, 3, and 4 have tiny granular tubercles on the ventral surface (Fig. 13, f), otherwise the legs show no secondary sex modifications.

Gonopods as described for the genus and as shown in figure 13, g.

Brachydesmus pallidus spec. nov.

A number of mature and immature specimens, including the male type, Lakeland Cave, Charleston, W. Va., Sept 2, 1937; two males, a female and a young specimen, Lawson Cave, Burks Garden, Va., July 3, 1937.

Fig. 14. *Brachydesmus pallidus.* Gonopod, outer lateral view.

Diagnosis. Smaller than *gladiolus,* the only other definitely known member of the genus in the eastern part of this country, and with obvious differences in the gonopods.

Description. Size small, not exceeding 8 mm. in length; segments, 19; color white or very pale brown, the antennae apparently darker than the body.

Head subglobular, the vertex broadly rounded, finely sulcate at middle, surface dull, minutely pitted; remainder of head, including the very prominent mandibulary stipes, finely hispid. Antennae strongly clavate, the sixth joint over twice as thick as the basal joints; joint 3 longest.

First segment subelliptical, the anterior margin more broadly rounded than the posterior margin; a row of ten small setae immediately behind the front margin, six setae across middle and ten in front of the back margin, the outer seta of this series in the lateral angle and capable of being included as belonging to the anterior row when the count would be 12–6–8; all setae on tiny tubercles; surface otherwise smooth.

Second segment with carinae slightly produced forward; the outer margin long, exceeding that of the next segment, with four tiny teeth, the foremost smallest, at times scarcely evident; succeeding nonporiferous segments with carinae 4-dentate, the poriferous carinae 5-dentate, with the anterior corner more angular and bearing a tiny tooth, the pores opening obliquely outward from between the fourth and fifth teeth, not opening from the dorsal surface; posterior corners of carinae slightly produced backward, those of the caudal segments slightly more so than at middle of body; poriferous carinae inflated on each side of a longitudinal depression which is scarcely indicated in the other segments, the surface more evenly inflated; dorsum of segments with two large transverse inflated areas in front, four small quadrate median areas and four similar posterior areas with a much smaller area on either side, all areas with a single tiny seta, those of the posterior areas projecting beyond the margin; entire surface of segments shining.

Gonopods as shown in figure 14.

First male legs reduced in size, only about half as large as legs 3–7, which are slightly crassate but otherwise normal.

Chaetaspis albus Bollman

A female, White's Cave, Cave City, Ky., June 29, 1937.

Although this is the first record of this species as a cave resident, it seems probable it will be found in other caves, as it appears to go deeper in the surface soil or humus than other members of the family and would find cave conditions quite to its liking.

Scytonotus granulatus (Say)

One specimen in bottle labeled "Dragon and Schofer Caves, Berks County, Penn., June 5, 1935."

Apheloria coriacea (Koch)

Male and female, Cedar Sinks Cave, (a small cave), Cave City, Ky., Aug. 20, 1935.

Oxidus gracilis (Koch)

Several specimens, Brownstone Cave, Dauphin County, Penn., Sept. 3, 1937.

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AT HARVARD COLLEGE
Vol. LXXXVI, No. 5

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SOME CHAZYAN SPONGES

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WITH SEVEN PLATES

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No. 5. — *Some Chazyan Sponges*

By Percy E. Raymond and Vladimir J. Okulitch

Sponges are fairly common in certain Chazyan limestones in Tennessee, Virginia, the Champlain Valley, and the Mingan Islands. In the following pages brief descriptions of some of the more prominent species, with illustrations, are presented. No satisfactory method of the study or description of the more common Ordovician sponges exists. Although skeletal structure is observable in the better preserved specimens, it is seldom possible to determine the nature of the spicules, and more often than not, the thin slices reveal nothing of importance.

In the present discussion, we have put most emphasis upon the gross structure, taking into account chiefly the outer form, the position of the canals, and the more obvious characteristics of the skeleton. These serve to define a number of rather easily recognized groups, and such a method of course facilitates identification.

This work was started by the senior author several years ago, but for various reasons was not finished. It was taken up and completed by the junior author during his stay at the Museum of Comparative Zoölogy, at intervals in his more regular work on Paleozoic corals. This part of the work was done on a fellowship awarded by the Royal Society of Canada.

The assembled material was restudied, paying attention both to the gross structure of the sponges and to the microscopic form of the spicules. It was found that although poor preservation tends to obscure the spicules, in many cases they can be distinguished both on the weathered surface and in thin sections. The majority of them contain tetracladine spicules of the *Aulocopium* type. It accordingly appears that they belong to the Aulocopidae.

These sponges are included with the Aulocopidae Rauff, (Rauff, Palaeontographica, **40**, **41**, 1893–94 & 1894–95) rather than with the Anthaspidellidae Ulrich, for two reasons. First, because *Aulocopium*, the type-genus of Aulocopidae, is better known and shows undoubted close similarity to our sponges; and secondly, because the true form of anthaspidellid spicules, as described by Ulrich, was placed under question by Rauff, who thinks that *Anthaspidella* Ulrich does not differ in any essential way from members of the European Aulocopidae. On examining the situation we came to the conclusion that the two families are so alike that it is better to combine them into one. Since recognition must depend on the type-genus, it seems best to leave Aulo-

copidae as the valid family name, since *Aulocopium* serves better as the type-genus than *Anthaspidella*.

Care must be exercised not to be misled by the two-dimensional appearance of the spicules in a chance section. At least one longitudinal and one cross-section of each specimen is required to get a correct idea of the three dimensional form of the spicules and their distribution through the sponge-body. Attempts to dissolve fragments of sponges, in the hope that spicules would be left in the residue, were not successful.

Family AULOCOPIDAE Rauff.

Genus Eospongia Billings

This genus was founded on two species which were obtained in the Chazy on the Mingan Islands, but as the type of neither has been figured, it has been little understood. The first species, *E. roemeri*, has been selected as the type by Bassler, and the second, *E. varians* transferred by him to *Zittelella*. Billings' diagnosis is as follows:

"Sub-globular, pyriform or sub-hemispherical sponges, not free, with an internal arrangement of pores (sometimes reticulated), radiating irregularly from the central axis; cup of variable depth."

It is obvious that in describing the genus, Billings had the sub-globular *E. varians* fully as much in mind as the pyriform *E. roemeri*, but since the latter has been selected as the type (U. S. Nat. Mus. Bull. 92, pt. 1, p. 491) its characteristics must determine the genus. Through the kindness of Drs. E. M. Kindle and A. E. Wilson of the Geological Survey of Canada, we were able to study the numerous specimens which constitute the types of both species of *Eospongia*, and to present figures of the more important ones.

Eospongia roemeri Billings

Pl. 1, fig. 1.

Eospongia roemeri Billings. Pal. Fossils Canada, adv. sheets, 1861, p. 19; Geol. Vermont, 1862, p. 956; Rept. Econ. Geol. Vermont, 1862, p. 228; Pal. Fossils Canada, 1856, p. 19. Twenhofel, Geol. Soc. of America, special papers, no. 11, 1938, p. 35, pl. 5, figs. 3, 4.

The Museum of the Geological Survey of Canada contains three specimens, numbered 1008 a–c, which are labelled as *Eospongia roemeri*. The largest, in two parts, 1008, 1008a, is the one whose measurements are given by Billings in his description, and this may be

considered the holotype. One of the others, 1009b, is a *Zittelella varians* and the third, 1008c, is a curious sponge with two dorsal depressions, which will be described on a later page.

The species must therefore be based on the single large individual, which is irregularly pyriform or club-shaped, with the greatest diameter some distance below the top. The upper end is nearly hemispherical, with a small, relatively shallow central depression. The lower end is incomplete, much compressed, and above it there is a swelling, succeeded by a constriction, which affects one side only, probably indicating interference with normal growth. The specimen has been sawed across transversely 48 mm. below the top, at the horizon where the diameter is greatest and the surfaces thus obtained have been polished. This section, like the weathered surface, shows that the sponge is ramified by large canals, oval to subcircular in section, which are approximately vertical in position and show but slight evidence of any regular radial arrangement. There are no radial structures of any sort, and no distinct grouping of vertical canals along the axial region. Those near the axis are somewhat larger than those near the periphery, but there is an irregular mingling of large and small tubes throughout the section.

Measurements. The holotype, broken at the lower end, is about 120 mm. high, (5.5 inches according to Billings, probably before it was cut in two), 69 mm. in greater and 60 mm. in lesser diameter where sectioned. The lower end, obviously deformed, is 43 mm. in greater and 20 mm. in lesser diameter. The top is considerably weathered, but appears to have been about 33 mm. in diameter; the dorsal depression about 15 to 20 mm. in diameter and at least 15 mm. deep, probably more, as the matrix is not all removed from its deepest portion. One of the larger canals is 3.00 mm. in greater and 2.50 mm. in lesser diameter. A small circular one is 1.50 mm. across.

Striking features of this sponge are the almost total lack of radial arrangement of the tubes and their consistently vertical position. In these respects the specimen is unique among the Chazyan sponges which we have seen, and the genus must apparently be restricted to forms having these characteristics. It may then be defined as:

Solitary, pyriform or club-shaped sponges, with a shallow dorsal depression, the substance traversed by approximately vertical tubes which are irregularly arranged, and not separated by radial structures. Type and only species, *Eospongia roemeri* Billings.

Formation and locality. The single specimen in the Museum of the Geological Survey of Canada is labelled "Chazy, Mingan Island,

Que." It was probably collected by J. Richardson in 1860 as it has a label in the same handwriting as one bearing Richardson's initials, and is of a different type from those collected by Sir William Logan in 1859. Twenhofel reports that the species is common in the lower fifty or sixty feet of the Mingan formation.

Genus Zittelella Ulrich and Everett

The original description was as follows: "Sponges simple, pedunculate and attached, varying in shape from depressed obconical, turbinate or sub-spherical to sub-cylindrical; rarely lobate. Upper surface with a shallow central depression into which a variable number of thin-walled vertical tubes, extending through to the base of the sponge, open. Canal system consisting principally of a series of radiating canals, which may inosculate freely with each other, or only to a limited degree in their passage through the walls of the sponge from the outer surface to the vertical central tubes. The radiating canals are closely arranged in vertical series, separated by spicular tissue from one to three times as wide as the canals. This arrangement of the canals gives the sponge the appearance of being divided by vertical fissures. Interior skeleton as in *Anthaspidella*, excepting that the capillary canals run parallel with the sides of the sponge wall, and open only at the upper surface.

"Under surface sometimes covered with a dense dermal layer. Type, *Z. typicalis*."

After studying the descriptions and figures in the Geological Survey of Illinois, volume 8, and a few actual specimens, it appears to the writers that the presence of conspicuous vertical radial structures is the most important feature of *Zittelella*. The species to be described have a deep dorsal cavity, but since they otherwise conform with the characteristics of the genus, they are placed here.

The distinctly aulocopid type of spicules found in the genus makes it necessary to consider *Zittelella* an aulocopid tetracladine lithistid sponge.

Zittelella varians (Billings)

Pl. 7, figs. 1–4.

Eospongia varians Billings. Pal. Fossils Canada, adv. sheets, 1861, p. 19; Geol. Vermont, 1861, 2, p. 956; Rept. Econ. Geol. Vermont, 1862, p. 228; Pal. Fossils Canada, 1865, 1, p. 19. Twenhofel, Geol. Soc. of America, special papers, no. 11, 1938, p. 36, pl. 5, fig. 2; pl. 6, figs. 3, 10.

Zittelella varians Schuchert and Twenhofel, Bull. Geol. Soc. Am., 1910, 21, p. 690; Bassler, Bull. U. S. Nat. Mus., 92, 1915, pt. 2, p. 1338. Howell, Bull. Wagner Free Institute of Science, 1938, **13**, No. 4, pp. 31–33, pl., fig. 4.

The specimens of *Eospongia varians* studied by Billings are numbered 999a–k, and 1109 in the Museum of the Geological Survey of Canada. No one of these shows the vertical tubes characteristic of *Eospongia*, but on the other hand, only two of them, 999 f, h, and 999 d, e, are *Zittelellas*. Since these answer fairly well to Billings' description of the species, one of them 999 f, h, may be taken as the holotype. Although, under ordinary conditions, the type would be selected from the more common rather than the rarer variety contained within the range of specimens included by the original author within his species, this form has gotten into modern literature as a *Zittelella*, and it will cause less confusion to let it remain there.

Description. Sponge rather small for the genus, irregularly top-shaped, with a deep, conical dorsal depression which extends nearly to the bottom of the individual. The upper surface is symmetrical, nearly circular, regularly curved, and the central depression occupies nearly one-third the whole diameter. The specimen shows the numerous regularly placed radial structures characteristic of the genus, and between them are canals which extend upward and outward; they are also pierced by numerous transverse openings, so that each partition is really a sort of lattice.

Measurements. The holotype is nearly circular, and 52 mm. in diameter. It is only 30 mm. high, but the greater part of the under portion is weathered away. The axial depression is 17 mm. in diameter at the top, extends through the specimen, and is 9 mm. across at the bottom. It appears to expand at the lower as well as the upper side, but this is doubtless due to weathering.

This species is similar to *Zittelella typicalis* Ulrich and Everett (Geol. Sur. Illinois, 1890, 8, p. 269, pl. 5, fig. 3, not fig. 5.) in shape and structure, but has a much deeper axial depression. It differs from the other varieties of *Z. typicalis* not only in that respect, but in shape.

It agrees with the other Chazyan species of *Zittelella*, described below, in having a deep axial cavity, but has much more numerous radial partitions.

Formation and locality. The two specimens mentioned were collected by Sir W. E. Logan in 1859 at Clear Water Point, Mingan Island, in strata which are included in zone A3 of the Mingan (Upper Chazy) formation of Schuchert and Twenhofel (Bull. Geol. Soc. Am.,

1910, 21, p. 690.) A third specimen, 1008b, is one of those associated with the holotype of *Eospongia roemeri*, but whether so identified by Billings or by some subsequent worker in the Museum of the Geological Survey of Canada is not clear. Twenhofel reports the species as being common in the lower fifty to sixty feet of the Mingan formation, wherever it is exposed on the Mingan Islands. It is however probable that he has used the term in the old broad sense.

Zittelella pannosa spec. nov.

Pl. 6, figs. 3, 4.

Description. Sponge hemispheric or funnel-shaped, with a large dorsal cavity which extends deeply into the structure. The general appearance, as viewed from above, is decidedly coral-like, the spicular

Fig. 1. Diagram representing canals and spicules of *Zittelella pannosa*. x 5.

partitions resembling septa, and varying in number from 54 to 72 in the specimens at hand. The dorsal cavity is broad at the top, making up about one-half the total width, conical in form, but the apex of the cone is truncated, so that the bottom is basin-shaped, and shows the hexagonal upper ends of a large group of vertical axial canals.

Measurements. A large individual from which a part of the lower end has been broken is 38 mm. high, 68 mm. in greater and 54 mm. in lesser diameter at the top, whereas the dorsal cavity is 39 mm. by 30 mm. at the top and extends through the specimen.

The spicules show both on the weathered surfaces of the sponge and in thin sections. Their shape leaves no doubt that the sponge is a

tetracladine lithistid of the *Aulocopium* type. In thin sections the spicules are seen to be replaced by transparent crystalline calcite. The vertical or axial canals appear to be bounded by fused or articulated spicules of somewhat larger size than the ordinary ones of which the spicular mesh is made. The length of the spicules averages 0.2 mm. The canals are mostly free of spicules, but occasional ones project or lie entirely within the canals.

This species differs from all those described from the Black River in the greater depth of the dorsal depression. It has fewer and thicker radial partitions and a larger dorsal depression than *Zittelella varians*.

Formation and locality. The cotypes are from the Ottosee, about 100 feet below the Lowville, between Luttrell and Chesney, Tenn. A single specimen was also found in the same formation at Dickenson's Mill, north of Mendota, Va., and in the Sevier near Neubert, east of Knoxville, Tenn.

Holotype, no. 9333 and paratype no. 9357, Museum of Comparative Zoölogy.

Genus Hudsonospongia gen. nov.

Nearly all of the sponges found in the Chazy of the Champlain Valley belong to species which do not appear to fit in any of the described genera. They vary from forms with so well developed a radial structure that they might almost be classed as *Zittelellae*, to those with so slight an appearance of such an arrangement that they might possibly be referred to *Streptosolen* Ulrich and Everett. In all cases they lack the regular radial partitions of *Zittelella*, and such radial arrangement as is present is expressed in the canals, which rise upward and outward from the base, with a group of axial canals which are nearly vertical. These sponges are all unbranched and the habit of most is pyriform or obconical, although some species are depressed.

The spicules are of the aulocopid type.

Although these sponges are most common in the Champlain Valley, we have selected a Tennesseean form as the type-species, because the specimens are better preserved. The genus is named for the late Professor George H. Hudson, in recognition of his valuable contributions to the knowledge of the Chazy.

Holotype, *Hudsonospongia cyclostoma* spec. nov.

HUDSONOSPONGIA CYCLOSTOMA spec. nov.

Pl. 3, figs. 1–4.

Description. Sponge pyriform, usually symmetrical, with a small shallow depression in the dorsal side. The greatest diameter is at or near the upper end, and the rate of taper is highly variable, some specimens being much more elongate than others. The lower end is smoothly rounded, and the method of fixation can not be determined. The top may be nearly flat, or convex, with a central depression about one-third the width, and of variable but not great depth.

The internal structure shows a number of nearly vertical canals in the axial region and other smaller ones which radiate upward and out-

Fig. 2. Spicules of *H. cyclostoma.*

ward from these to the surface. The spaces between the canals are filled by a spicular meshwork. The spicules are of distinctly aulocopid tetracladine type, but are smaller than those of *Zittelella pannosa,* (about 0.1 mm. long), and appear as slender straight rods, somewhat thickened at the ends. They are in many cases arranged at right angles or nearly right angles to each other. Transverse sections show that the spicules have a tendency to be arranged in radial lines, the long axis of each spicule lying normal to the circumference. (Pl. 3, fig. 2.).

Measurements. The largest specimen yet collected is 97 mm. high and 46 mm. in greatest diameter. As shown on pl. 3, fig. 1, this individual is unsymmetrical at the upper end. The depression is 11 mm. wide, and about 20 mm. deep, measured down from the lower shoulder. Near the lower end the diameter is about 14 mm. A small individual is 31 mm. high, 26 mm. in greatest diameter, and the depression is 9 mm. across.

This species differs superficially from *Eospongia roemeri* in having the greatest diameter nearer the top, and in being much smaller and more nearly obconical. Fundamentally, the arrangement of the canals is entirely different.

Formation and locality. The only locality which has so far produced

this form is an exposure of the Lenoir on a hillside about 6 miles south-east of Knoxville, Tenn.

Holotype no. 9339, Museum of Comparative Zoölogy.

Hudsonospongia minganensis spec. nov.

Pl. 4, fig. 3.

Sponge depressed pyriform with a shallow dorsal cavity occupying about one third the total diameter. The substance shows some vertical axial canals, and other tubes that are directed upward and outward from the base, to form irregularly placed oval openings on the top and sides.

The external appearance is almost identical with that of *Zittelella varians,* with which it is associated, but it lacks the regular radial partitions of that species and the dorsal cavity is shallow. All specimens are much smaller than the similar *H. porosa* of the Champlain Valley.

Measurements. The types are in the Museum of the Geol. Survey of Canada. A complete though small individual is 20 mm. high and 25 mm. in diameter near the top.

Formation and locality. The four known specimens are among Billings' types of *Eospongia varians.* The holotype, 999 g, i, was collected by J. Richardson from the Upper Chazy of the Mingan Islands in 1860. Two specimens, 999 j, k, are from the same region but lack special data. The fourth, no. 1109, which is considerably weathered on the lower side, was collected by Sir W. E. Logan in 1859 and is labeled "Ammonite Point, Mingan".

Hudsonospongia porosa spec. nov.

Pl. 6, figs. 1, 2; pl. 7, fig. 5.

Sponge pyriform or top-shaped, with a shallow bowl-like depression. The substance is penetrated by vertical canals which bend outward as they rise, and also by branching tubes which radiate from the axial cavity. The spicular mesh produces a framework which in sections has an irregularly radiating appearance. It is very complex, consisting of fairly thick, elongated, knobby spicules. The canals penetrating the mesh appear to be lined by a more solid and imperforate skeletal tissue. Spicules are on the average between 0.2 mm. and 0.3 mm. long, replaced by transparent crystalline calcite. The replacement of original silica by crystalline calcite has obliterated all details of how the spicules

are connected with each other, and the junction of spicules appears in most cases as an irregular thickened spot of calcite. There can be very little doubt, however, that the sponge is a tetracladine lithistid.

Measurements. No complete specimen has been seen, so that accurate proportions cannot be obtained. A natural section in a nearly vertical plane, which did not cut the axial cavity (figured, pl. 7, fig. 5) is 72 mm. high and 70 mm. across near the top. An individual which is probably nearly complete is 60 mm. high, 72 mm. in diameter at the top, which is worn down, and the dorsal depression is 23 mm. wide. A small specimen is 50 mm. high, 54 mm. in greatest diameter 10 mm. below the top, and the dorsal cavity is 16 mm. in diameter, but as it is weathered across diagonally, its real dimensions cannot be learned.

This species differs from *H. minganensis* in its larger size, and from both it and *H. fistulosa* in having the radial tubes much more prominent in weathered sections.

Formation and locality. A common species in the Middle and Upper Chazy of the Champlain Valley, where it has been collected at South Hero and on Isle La Motte, Vt., and at Chazy and Valcour Island, N. Y. The holotype is no. 9349, and the paratypes nos. 9340, 9350, Museum of Comparative Zoölogy.

Hudsonospongia fistulosa spec. nov.

Pl. 1, fig. 3.

Sponge large, basin-shaped, with a shallow dorsal depression, beneath which is a group of large vertical canals axially arranged, whereas smaller ones penetrate the substance of the individual in a more or less radial fashion. The preservation of these specimens is very poor and spicules could not be distinguished.

Measurements. A large individual, nearly complete above, but much weathered below, is nearly circular in outline, 125 mm. in diameter near the top, and 36 mm. high. The dorsal depression is about 43 mm. in diameter and 12 mm. deep. A weathered section which was cut horizontally below the base of the dorsal depression of another specimen is 150 mm. in diameter. A small individual is only 40 mm. across.

This species differs from the previous one in its more depressed shape and less marked radial arrangement of canals, and from *H. minganensis* principally in its much greater size.

Formation and locality. Fairly common in the Middle and base of the Upper Chazy at Chazy N. Y. and on Isle La Motte, Vt. Holotype no. 9334, Museum of Comparative Zoölogy.

Hudsonospongia irregularis spec. nov.

Pl. 4, figs. 6, 7.

Among Billings' types of "*Eospongia varians*" there is a second *Hudsonospongia* of irregular, lobate shape. The one selected as the holotype, 999 b, is probably one of those mentioned by Billings as having grown around the stem of a crinoid, though in this case the foreign object is a bryozoan which was encountered in the upward growth, and which to a slight extent modified the shape of the dorsal cavity. This species differs from *H. minganensis* not only in its irregularly lobate form, but also in its deeper dorsal depression and more obviously radial surficial canals, which are conspicuous and numerously branched.

Zittelella lobata Ulrich and Everett, (Geol. Illinois, 1890, 8, p. 270, pl. 4, figs. 3a–c) is a similar though larger form. The absence of regular radial partitions shows that the present species can not be referred to *Zittelella*. Whether Ulrich and Everett's species is really a *Zittelella* or a *Hudsonospongia* there is nothing in the description or figure to indicate.

Measurements. The holotype is 40 mm. in greater and 31 mm. in lesser diameter and about 25 mm. high. The dorsal depression is nearly circular and about 10 mm. in diameter.

Formation and locality. From the Upper Chazy on the Mingan Islands. Exact formation and locality not known. Types in the Museum of the Geological Survey of Canada.

Hudsonospongia duplicata spec. nov.

Pl. 4, fig. 1, 2.

A unique specimen, 1008 c, which was associated in the collection of the Geological Survey of Canada with *Eospongia roemeri*, has on its upper surface two depressions, but whether it was formed by the coalescence of two individuals or indicates fission, can not be determined. Such twin forms are fairly common among the sponges, and are usually caused by a transverse constriction of the bowl. Similar forms were recognised by Bornemann and Taylor even among the Lower Cambrian archaeocyathids. Ordinarily such variations of form are not of specific significance, and only poor preservation and lack of structural details forces us to describe this specimen as a new species.

The individual is low, oval in outline as viewed from above, and the two depressions are small and close together.

Measurements. Height, 21 mm., greater diameter at top, 47 mm., lesser 35 mm. Each depression is about 10 mm. in diameter.

Formation and locality. From the Upper Chazy on the Mingan Islands.

Hudsonospongia ovoidea spec. nov.

Pl. 4, fig. 5.

Sponge small, nodule shaped, with a rather large deep dorsal depression. Substance pierced by irregular radial canals which show as oval openings in the weathered surface.

Spicules are indistinct, poorly preserved. They appear as short, slender, straight or curved rods, in many cases arranged at right angles to one another as in *Hudsonospongia cyclostoma* and are about 0.2 mm. long.

Measurements. The holotype and unique specimen is 20 mm. high, 43 mm. in greater and 35 mm. in lesser diameter. The dorsal depression is nearly circular, bowl-shaped, about 14 mm. in diameter and 7.5 mm. deep.

Formation and locality. From the Middle Chazy, 1.5 miles west of Chazy, N. Y. No. 9335, Museum of Comparative Zoölogy.

Genus Exochopora gen. nov.

Sponge similar in form to *Eospongia* but with large radial canals arranged one above another, so that the surface is marked by prominent pores in vertical series. Internal cavity large and deep. Type, *Calathium canadensis* Billings, (Pal. Foss. Canada, 1865, **1**, p. 377, fig. 351).

This genus appears to be allied to *Zittelella* in the regular vertical arrangement of the skeletal parts, to *Eospongia* in form, and to *Rhopalocoelia* in the depth of the axial cavity. *Exochopora canadensis* (Billings) was obtained from the Chazy on the Mingan Islands. The only other species is *E. infelix* (Ulrich and Everett) (Pal. Illinois, 1892, **8**, p. 274, pl. 5, figs. 1, 1a), from the Black River near Dixon, Illinois.

Genus Allosaccus gen. nov.

This name is suggested for concavo-convex, sub-hemispheric sponges which are attached by the whole base and have a system of canals which radiate from a center on the upper side.

Superficially, members of this genus resemble *Hudsonospongia* or *Zittelella*, but the attachment is by a broad concave base instead of a stalk and there are no vertical radial partitions.

Spicules are of *Aulocopium* type.
Type, *Allosaccus prolixus*, spec. nov.

Allosaccus prolixus spec. nov.

Pl. 1, fig. 2; pl. 2, fig. 1, 2; pl. 5, fig. 5.

Discoid to sub-globose sponges with concave lower and convex upper surface. The greatest diameter is at or just above the base and the upper side is more or less regularly hemispherical. At the summit is a small, shallow pit, and the whole appearance is suggestive of a small stalagmite. When weathered, as practically all specimens are, the substance is seen to be traversed by large, radial, somewhat tortuous canals, some of which lie near the surface whereas others occupy the central portion. These canals converge toward a center at the base of the apical depression, and in that region they are so numerous that they lose their circular outline, become hexagonal, and are bounded by thin-walled partitions. Towards the distal ends, the canals branch irregularly.

The basal concavity may be shallow or deep, and there appears to be an epithecal deposit covering that side. Specimens have not been found attached to the objects on which they grew.

The spicular mesh is dense and complex. The spicules appear to be irregular, angular, curved, or rod-like, occasional ones with denticulate edges, and varying greatly in size. (pl. 5, fig. 5). The canals near the apical depression are bounded by thin walls. These walls are made of elongated spicules arranged mostly in single series, but not fused or articulated. Between the canals the mesh is made of smaller spicules among which the angular, forked, or three-rayed star type, characteristic of tetracladine aulocopid spicules are prominent.

Measurements. The type is 88 mm. in greatest diameter, about 50 mm. high, and some of the larger canals are 1 mm. in diameter. The largest individual is 145 mm. in greater and 120 mm. in lesser diameter and 65 mm. high.

This species is probably one which has been identified as *Zittelella varians* (Billings), since that species has been reported from the Lenoir, but in its habit is unlike that form, which is convex on the lower and concave on the upper surface.

Formation and locality. The type is from the lower part of the Ottosee at Dickenson's Mill, north of Mendota, Va. It is not, however, a common species in the Ottosee, but is very abundant in the Lenoir, in East Knoxville, and other localities east and south of Knoxville,

Tenn. The holotype is no. 9336, and the paratypes nos. 9351, 9352, Museum of Comparative Zoölogy.

Genus Rhopalocoelia gen. nov.

Elongate, cylindrical or club-shaped sponges, with an axial cavity reaching almost to the base. Numerous large, branched canals extend from the inner to the outer walls, with a course perpendicular to the sides. Exterior surface smooth or nodulose.

Type, *Rhopalocoelia clarkii* spec. nov.

No complete specimen has been found, and the upper end is unknown. The most characteristic features are the nearly cylindrical form and deep cloacal cavity. The spicules are of the *Aulocopium* type. *Calathium* Billings, of which *C. formosum* is the type (Pal. Foss. Canada, 1865, **1**, p. 209) seems to be a nearly allied genus, but has larger and more regularly arranged canals. *Aulocopium cylindraceum* F. Roemer, (Rauff, 18 5, Palaeontographica, **41**, nos. 5-6, p. 394) is also a closely allied form, and possibly should be removed from *Aulocopium* and included with the new genus *Rhopalocoelia*.

Rhopalocoelia clarkii spec. nov.

Pl. 5, figs. 1–4.

A large, high, club-shaped sponge, irregularly oval in section, with the axial cavity less than one-half and more than one-third the total diameter. The radial canals are numerous, small, and show as irregu-

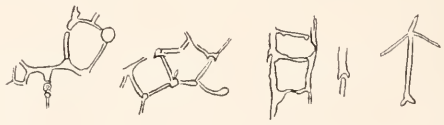

Fig. 3. Spicules and their arrangement in *R. clarkii*.

larly placed scattered dots on the outer surface. The spicular mesh is built mostly of tetracladine type of spicules, similar to those of Aulocopidae. They are shown in the accompanying diagramatic sketch and on pl. 5, figs. 4a, 4b. They are from 0.2 mm. to 0.4 mm. long. In longitudinal sections the spicules are arranged in ladder-like series. The cross-sections show a parallelogram-like arrangement, each corner or joint marked by a spot of calcite. It seems, therefore, that the skeletal mesh is built of rhombohedral elements, the edges of each

rhombohedron being made of elongated spicules, thus closely resembling the generalised aulocopid reconstruction worked out by Rauff. (Palaeontographica, **41**, p. 249, 1895.) The general form of the sponge and the presence of aulocopid spicules leaves no doubt that this sponge is a lithistid and belongs with the Aulocopidae.

The basal termination is shown by a few individuals and is bluntly pointed. The mature part does not taper greatly, and is either straight or gently curved. The exterior has a number of large, irregular swellings which are not symmetrically placed.

Measurements. One of the fragments, a weathered longitudinal section, is 145 mm. high and the diameter varies from 45 to 60 mm. according as it is measured across an enlarged or a constricted area. The axial cavity is from 18 to 20 mm. in diameter. Another weathered piece is 152 mm. long, gently curved instead of straight, and too deeply weathered to give satisfactory measurements. The longest individual, broken at both ends, is 180 mm. long and about 50 mm. in diameter.

Two specimens, one collected by Dr. T. H. Clark and the other by the senior writer, show a lining of elongate, irregularly curved bodies within the axial cavity. Their size precludes them from being spicules, and they are probably foreign bodies that found their way into the axial cavity accidentally.

Formation and locality. Found in the lower part of the Upper Chazy at Tiger Point, and in the lower part of the Middle Chazy east of Pebble Beach, both on Valcour Island, N. Y. Also in the Middle Chazy west of Chazy, N. Y., and on Isle La Motte, Vt., and at the base of the Upper Chazy at Little Monty Bay, east of Chazy, N. Y.

Collected by Dr. T. H. Clark, for whom it is named, and the senior writer. The holotype is no. 9338, and paratypes nos. 9353, 9354 in the Museum of Comparative Zoölogy.

Rhopalocoelia regularis spec. nov.

Pl. 4, fig. 4.

This species may be briefly described as being smaller in size, and possessing a proportionally larger internal cavity and larger radial canals than *R. clarkii*. The exterior surface appears to show regular expansions and contractions, which do not affect the diameter of the inner cavity.

The outer wall appears to be slightly thinner than the inner, and its pores are considerably larger in diameter than those of the inner.

The radial canals lead from the large pores on the outside to a rounded chamber near the inner wall which in turn is connected by a short narrow passage with the axial cavity. No spicules were seen, but the general shape of the organism suggests that it is an aulocopid sponge

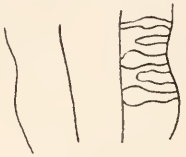

Fig. 4. Diagram showing the radial canals of *R. regularis*.

closely allied to *Rhopalocoelia clarkii*. It is also to be noticed that there is a great general resemblance to the Pleospongia of the Lower Cambrian.

Measurements. The unique specimen is 49 mm. high with the lower end incomplete. The whole diameter at the upper end is 15 mm., that of the cavity 7 mm. At the first constriction, 12 mm. below the top, the diameter is 12 mm.

Formation and locality. A single individual was collected by the senior writer from the Sevier near Neubert, east of Knoxville, Tenn. Museum of Comparative Zoölogy. no. 9332.

Genus Psarodictyum gen. nov.

Large sponges with depressed, discoid form, the skeleton consisting of slender radiating and concentric elements, made of aulocopid spicules.

This genus appears to be allied to *Zittelella* in the regularity of the radial partitions, but differs from it in its flattened form with wide dorsal depression and in the abundance and regularity of the concentric elements. The genus resembles *Hudsonospongia* in the arrangement of the spicular elements.

Type *Psarodictyum magnificum* spec. nov.

Psarodictyum magnificum spec. nov.

Pl. 1, fig. 4, pl. 2, fig. 3.

Sponge large, shaped like a shallow circular basin or broad low funnel, the dorsal depression shallow and coextensive with the upper surface. Margin weakly and irregularly lobate, the chords of the lobes measuring 35 to 50 mm. Substance thin, flexible. The radial elements

are prominent, thin, about 1.00 to 1.25 mm. apart, and crossed by almost equally strong concentric bars which are from 1.00 to 1.50 mm. apart. The lower surface shows oval pores in the little rectangles so formed. The radial elements bifurcate, and the whole appearance is similar to that of the non-zoöecial side of a fenestellid.

The spicules, making up the radial and concentric elements, are of tetracladine aulocopid type, in some cases complicated by bifurcation at the ends. They are arranged in ladder-like radiating series. Poor preservation, due to replacement of original silica by crystalline calcite, obscures the details of structure, such as the methods of articulation, etc., the ends of spicules appearing as thickened, irregular nodes.

Measurements. The holotype, a fairly complete specimen, is nearly circular, and 500 mm. in diameter. A larger specimen that was measured but not collected, was about 1015 mm. (40 inches) across. These are, so far as known, the largest sponges yet reported from the Palaeozoic.

Formation and locality. This species has so far been found only on Valcour Island, N. Y. It is common in a layer near the base of the Upper Chazy at Tiger Point, and a single fragment was obtained at the same horizon on the Christmas farm on the northwestern side of the Island.

Holotype no. 9330, and paratypes nos. 9555, 9556, Museum of Comparative Zoölogy.

Psarodictyum planum spec. nov.

Pl. 1, fig. 5.

Sponge so low and broad as to be almost discoid, with a shallow concavity which occupies the entire upper surface. The vertical radiating partitions are numerous and are connected at intervals by thin plates, which produce an effect of concentric markings. Where well preserved, the lower surface shows radially arranged pores, and in the center of the upper side is a large group of circular and polygonal openings of vertical canals.

The spicular mesh is dense. The spicules are poorly preserved; however, straight, and strongly curved ones are distinguishable. The pores on the lower surface appear to be bounded by dentate and curved spicules, some of which are almost horse-shoe shaped. In view of the fact that aulocopid spicules are present, and that the megascopic appearance of the sponge is much like that of the preceding species, this sponge is placed in *Psarodictyum.*

Measurements. The specimen is 20 mm. high and 93 mm. in greatest diameter. The group of openings of vertical canals is 13 mm. across.

This species is similar to *P. trentonensis* (Worthen), differing from it chiefly in its lower and wider form and more shallow depression.

Formation and locality. One specimen was collected by the senior writer from near the top of the Sevier, 5 miles north-west of Rogersville, Tenn. Another specimen sent by Dr. Decker, came from the Middle McLish of the Arbuckle Mountains of Oklahoma.

Holotype no. 9331, Museum of Comparative Zoölogy.

Psarodictyum trentonensis (Worthen)

Cnemidium ? trentonensis Worthen. Geol. Survey Illinois, 1875, 6, p. 491.

Palaeospongia trentonensis Miller. N. A. geol. and pal., 1889, p. 162, fig. 113.

Zittelella trentonensis Ulrich and Everett, Geol. Survey Illinois, 1890, 8, p. 270.

This sponge, which is much like the last species described has been found only in the Black River near Dixon, Illinois.

EXPLANATION OF PLATES

PLATE 1

PLATE 1

Fig. 1. *Eospongia roemeri* Billings. Holotype. X 2/3.

Fig. 2. *Allosaccus prolixus* Raymond and Okulitch. Paratype. X 1/2.

Fig. 3. *Hudsonospongia fistulosa* Raymond and Okulitch. Holotype. X 1/3.

Fig. 4. *Psarodictyum magnificum* Raymond and Okulitch. Holotype. X 1/8.

Fig. 5. *Psarodictyum planum* Raymond and Okulitch. Holotype. X 1/3.

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PLATE 2

PLATE 2

Fig. 1. *Allosaccus prolixus* Raymond and Okulitch. Holotype. Natural size.

Fig. 2 a, b. The same species. A thin section showing spicular mesh and axial canals. X 10.

Fig. 3. *Psarodictyum magnificum* Raymond and Okulitch. Thin section showing the radial and concentric elements of the spicular mesh. X 10.

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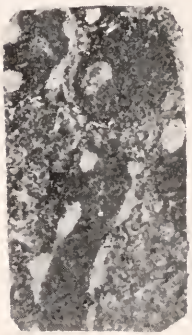
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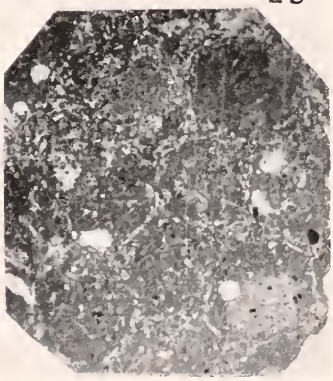
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PLATE 3

PLATE 3

Fig. 1. *Hudsonospongia cyclostoma* Raymond and Okulitch. Holotype. Natural size.

Fig. 2. The same species. A thin section showing the radial arrangement of spicules and canals. X 5.

Fig. 3. The same species. A thin section showing distinct aulocopid spicules of the spicular mesh. X 10.

Fig. 4. The same species. A paratype from which the sections were made. It was eventually destroyed in the process of sectioning.

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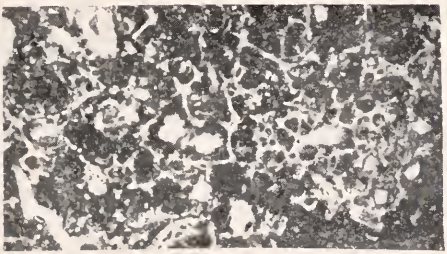

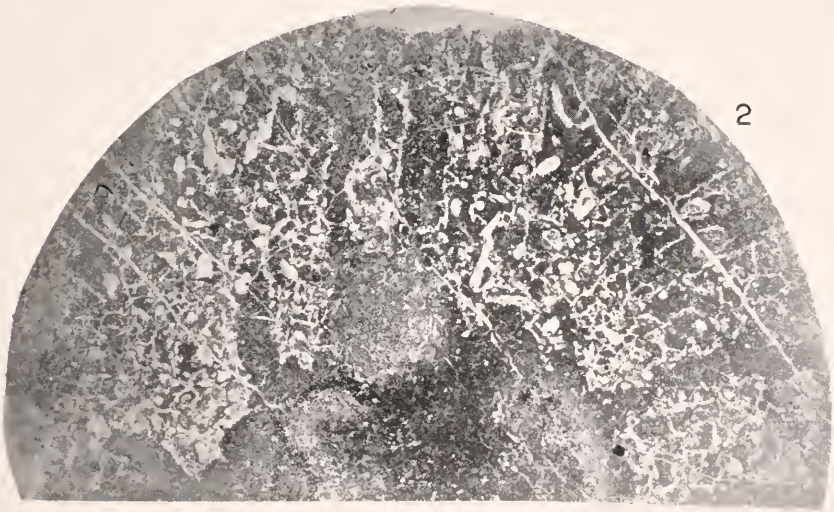

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PLATE 4

PLATE 4

Fig. 1. *Hudsonospongia duplicata* Raymond and Okulitch. Dorsal view. Natural size.

Fig. 2. The same species. Lateral view. Natural size.

Fig. 3. *Hudsonospongia minganensis* Raymond and Okulitch. Polished vertical section. Natural size.

Fig. 4. *Rhopalocoelia regularis* Raymond and Okulitch. A specimen showing the deep inner cavity, walls, and radial canals. X 2/3.

Fig. 5. *Hudsonospongia ovoidea* Raymond and Okulitch. The holotype. X 2/3.

Fig. 6. *Hudsonospongia irregularis* Raymond and Okulitch. Natural size.

Fig. 7. The same species. A smaller specimen. Natural size.

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999 b
999 a

PLATE 5

PLATE 5

Fig. 1. *Rhopalocoelia clarkii* Raymond and Okulitch. Holotype. Longitudinal section. X 2/3.

Fig. 2. The same species. Paratype. Transverse section. X 2/3.

Fig. 3. The same species. Longitudinal section, showing spicular mesh. X 8.

Fig. 4 a, b. The same species. Paratype. Transverse section, showing arrangement of spicules. X 8.

Fig. 5. *Allosaccus prolixus* Raymond and Okulitch. A thin section showing the dense spicular mesh. X 10.

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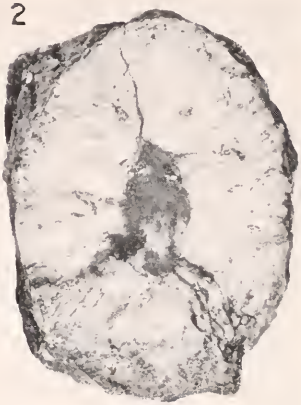
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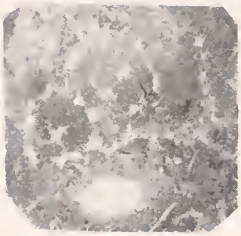
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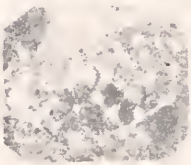
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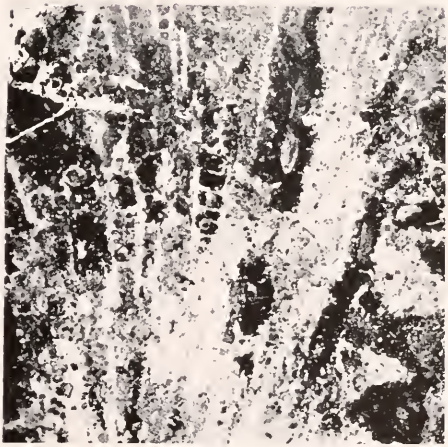
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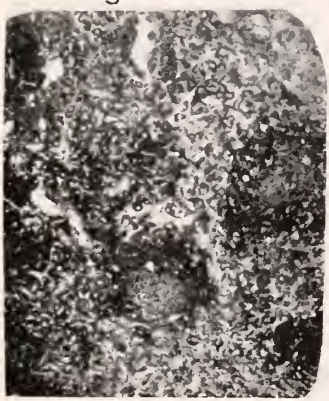
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PLATE 6

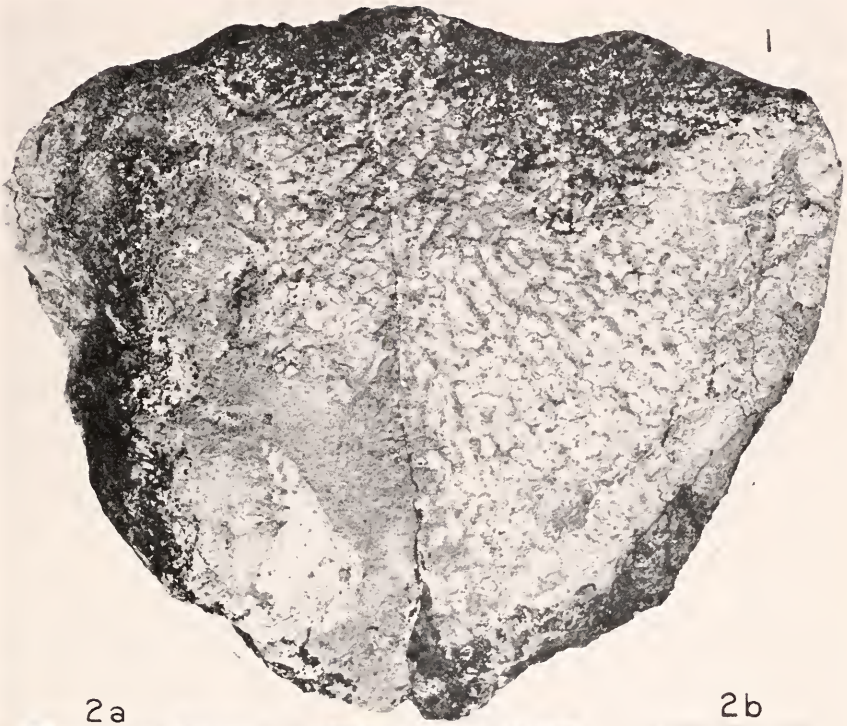
PLATE 6

Fig. 1. *Hudsonospongia porosa* Raymond and Okulitch. Paratype. X 3/4.

Fig. 2 a, b. The same species. A thin section of the holotype showing spicules and canals. X 10.

Fig. 3. *Zittelella pannosa* Raymond and Okulitch. Dorsal view. X 5/6.

Fig. 4. The same species. Lateral view. X 5/6.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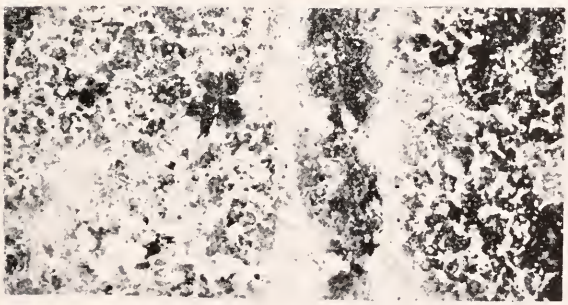
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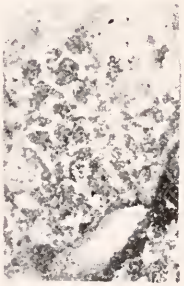
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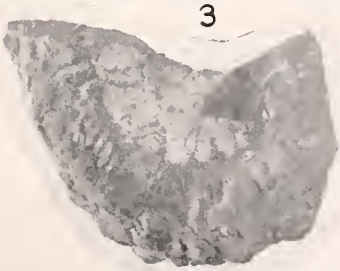
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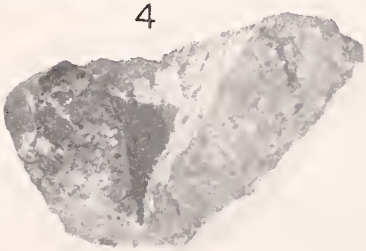
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PLATE 7

PLATE 7

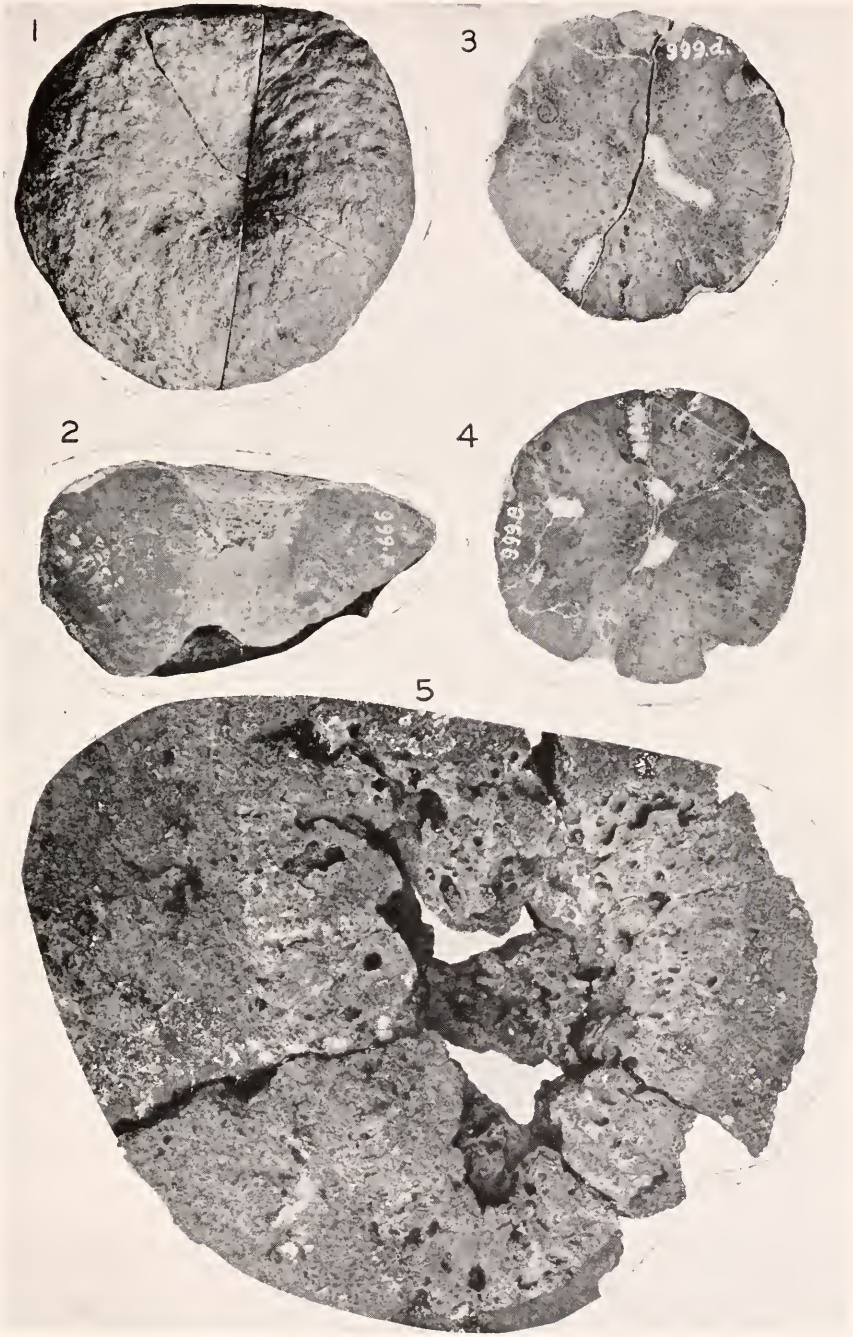
Fig. 1. *Zittelella varians* (Billings). The holotype. Natural size.

Fig. 2. The same species. A polished vertical section of the holotype. Natural size.

Fig. 3. The same species. A transverse section of the paratype. Natural size.

Fig. 4. The same species. A transverse section of the paratype. Natural size.

Fig. 5. *Hudsonospongia porosa* Raymond and Okulitch. Paratype. Natural size.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Bulletin of the Museum of Comparative Zoology
AT HARVARD COLLEGE
VOL. LXXXVI, NO. 6

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MIGRATIONS OF NEW ENGLAND BATS

BY DONALD R. GRIFFIN

WITH FIVE PLATES

CAMBRIDGE, MASS., U.S.A.
PRINTED FOR THE MUSEUM
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No. 6. — *Migrations of New England Bats*

By Donald R. Griffin

The phenomena associated with bird migrations are among the most complex and inexplicable to be found in biology. Consider for example the golden plover; the mere statement of its migration routes presents a challenge to the biologist. How can this small shorebird find its way from Alaska to the Hawaiian Islands over 2000 miles of open ocean — and how can the young birds make their way from the Arctic Ocean to the Argentine on their first flight, in some cases, *without older birds to guide them?* (Clark, 1905; Henshaw, 1910; Lincoln, 1935).

Other fundamental problems are raised by recent experiments demonstrating the influence of light on the anterior pituitary, and indirectly on the gonads and on migration. (Rowan, 1931; Bissonette, 1938; and Benoit, 1936). The related problem of homing and distant orientation has also received attention (Rüppell, 1935, 1936 and 1937; Watson and Lashley, 1915), and here too much remains to be explained.

It is not the purpose of this paper to discuss the problems of bird migration, but the far-reaching nature of these problems justifies, in my opinion, a careful study of all related phenomena, such as the homing behavior and migrations of other animals.

The word "migration" is sometimes used loosely to cover many different types of animal movements. It seems best to restrict the term to the regular, periodic movements of a population to a new environment and their return to the area from which they started, the period of a complete cycle usually being one year. Only true migrations in this sense will be considered here.

Bats are the only living vertebrates, other than birds, which fly, and there is a considerable body of evidence to indicate that some of them migrate. In this paper I shall review this evidence and present the results of a banding study of New England bats in which I have been engaged during the past six years. During this period I have banded 11,739 bats of six species in New England and eastern New York State, and over 2000 recaptures of banded bats have been recorded.

It is impossible to acknowledge here all the assistance I have received in the course of the actual banding. Only with the assistance of several other college students was it possible to handle this number of bats on weekend and vacation trips to caves and mines, which are often located in regions difficult of access. The following have joined me on several of these trips and I wish to express my gratitude for their indispensable aid: Frederick L. Osgood of Rutland, Vt., Thomas L.

Perry, Harold B. Hitchcock, Garrett Eddy, G. Edgar Folk, Philip Morse, Robert B. Holden and Douglas Robinson of Harvard University. I am particularly indebted to Associate Professor Jeffries Wyman for many suggestions and for his advice in preparing Appendix I and to Professor Glover M. Allen for his valuable criticism and his encouragement at all times.

The bats of New England are fairly typical of those of the temperate parts of the Northern Hemisphere, and this paper will be concerned primarily with them, not because they are intrinsically more important than the bats of any other region, but because my own experience has been confined to the northeastern United States. The problems are not local, and evidence obtained in one part of the world is applicable with reservations to the study of bats in any other area of similar climatic conditions.

Nine species and sub-species of bats have been recorded from the New England States, and all of them belong to the family Vespertilionidae. They were divided by Merriam (1887) on the basis of their habits into two groups, the cave bats and the tree bats. The forms found in New England are closely related, and this grouping is based on behavior and ecology, not on morphological or taxonomic differences.

Cave bats hibernate in caves during the winter, and they often spend the daytime in buildings or hollow trees during the summer. Some are very gregarious, and three or four hundred may congregate in the crevices in the loose trim of a single building, while a large cave may contain thousands. (Sherman, 1929; Allen, 1921; Banta, 1907; Bailey, 1928 and 1931; Hahn, 1908; Blatchley, 1896; and Mohr, 1933). These large summer colonies usually contain only females and their young which are born in June. This habit of congregating in breeding colonies (or *Wochenstuben* = maternity wards) is apparently common to the genus *Myotis* in both Europe and North America (Eisentraut, 1934 and 1936; Barret-Hamilton, 1910; Griffin, 1934 and 1936; and Sherman, 1929).

The following species classed as cave bats are found in New England:

Eptesicus f. fuscus (Beauvois), the big brown bat
Myotis l. lucifugus (LeConte), the little brown bat
Myotis sodalis Miller and Allen, the cluster bat or pink bat
Myotis keenii septentrionalis (Trouessart), the Say bat
Myotis subulatus leibii (Aububon and Bachman) the least brown bat
Pipistrellus subflavus Miller, the pipistrelle

The last four are not common in New England, and no very large breeding colonies of these species have been reported, although they all pass the winter in New England caves.

The tree bats are seldom found in caves (Merriam, 1887; Rhoads, 1903; Mohr, 1932c), and apparently they are not nearly so gregarious as the cave bats. They are not found in large summer colonies in buildings, and they normally spend the daytime singly or in small groups in trees.[1] There is one record of several young bats, uncertainly identified as the silver-haired bat, *Lasionycteris noctivagans*, being found in an old crow's nest (Merriam, 1884). The tree bats found in New England are:

Lasiurus borealis (Müller), the red bat
Lasiurus cinereus (Beauvois) the hoary bat
Lasionycteris noctivagans (LeConte), the silver-haired bat

Both cave bats and tree bats feed exclusively on flying insects, and in climates like New England's this source of food is practically nonexistent during the winter months. Therefore one can reason *a priori* that all these bats must either (a) migrate south to regions where insects are available throughout the year, (b) find other sources of food, (c) store food, or (d) hibernate. All who have studied bats most closely agree that in their natural state the species found in the eastern United States eat nothing but insects. (Seton, 1910; Hahn, 1908; Barret-Hamilton, 1911). Nor does insect food lend itself to storage. Apparently such food is usually caught on the wing, and is either eaten while the bat is flying or while it is hanging from an elevated support. Under such circumstances, pieces of prey once dropped are lost for good. This seems to have had its effect on the feeding habits of the animals, for even in captivity they lose all interest in a morsel of food, if it once drops from their mouth. (Hahn, 1908.)

Migrations of Tree Bats

Merriam (1887) was apparently the first to point out that the three species of tree bats breed in the transition, Canadian and boreal faunal zones of North America,[2] and yet that they are never found hibernating in caves. In winter these bats are regularly taken far south of their summer range. Merriam mentions a hoary bat taken at George-

[1] See footnote on page 220.
[2] For a discussion of Faunal Zones and Indicators see Merriam (1898).

town, S. C., in January, 1887 and another from Savannah, Georgia in February of 1886, while Miller (1897) reported one killed at Brownsville, Texas in late October. More recent collections would swell the list, but the general picture remains the same for all three tree bats; a northern breeding range from which the bats are absent in winter, and a southern winter range, where the hoary and silver-haired bats are not found in summer.[1] The red bat breeds over a large area, including part of its winter range, so that one cannot notice sharp differences in its seasonal distribution. (Stephens 1906; Seton 1909.)

Merriam reported (1887) that silver-haired bats appeared every spring and fall at Mt. Desert Rock, 30 miles from the Maine coast and 15 miles from the nearest island. Bats of any kind were unknown on this barren rock at other seasons. Miller (1897) reported that all three species of tree bats appeared in autumn at Highland Light, Truro, Mass., on the tip of Cape Cod. Tree bats have not been reported on the dry infertile lower Cape during their breeding season, and it seems most likely that the small flocks reported by Miller were migrating south along the coast. Saunders (1930) reported that hoary and silver-haired bats flew against a lighthouse on Lake Erie along with migrating birds. Howell (1908), Rhoads (1903) and Mearns (1898) have reported flocks of bats seen flying during the daytime — evidently in migration.

Furthermore there are several records of tree bats alighting on ships some distance from land during the autumn months. No one of these records alone would be of any extreme significance, but when taken together they present an impressive picture. Allen (1923) reports that a flock of unidentified bats alighted on a ship "10 miles off the Delaware River" in September, 1902, according to a newspaper account. Nichols (1920) reports that a red bat boarded a ship between

[1] The description here presented of the habits of tree bats seems to be the typical one, based on the reports of recent observers. Like any set of rules for animal behavior there are bound to be occasional exceptions. Thus Hahn (1908) reports skulls of *Lasiurus cinereus* and *Lasiurus borealis* found in caves, indicating that in the past these species may have had different habits. Godman (1842) quotes a report that red bats were found hibernating in caves south of Albany, New York, but unfortunately the identification was not certain and no specimens were taken. I have visited caves in this region without ever finding a single tree bat among hundreds of the cave dwelling species. Merriam (1884) speaks of the silver-haired bats inhabiting caves although he does not specifically mention ever finding one below ground. Seton (1909) writes that the red bat is "known to gather in vast numbers in caves of its more southerly range" but gives no authority. Stone and Cram (1903) make the same statement, likewise without authority. Like Mohr (1932c) the writer is "skeptical of cave records (of tree bats) not verified by specimens".

There are a few records of large colonies of tree bats in houses. Stone and Cram describe (1903, p. 203) a colony of red bats in the attic of a house. Merriam (1884) quotes a letter from William Brewster saying that lumbermen told him of finding bats *in winter* in logs brought in for firewood. This was not Merriam's own experience (1887), and on a subject where confusion of dates and exact circumstances is so apt to arise popular reports are notoriously unreliable.

All of these records run counter to the weight of evidence accumulated by more recent observers, and it seems that they must represent atypical cases. Furthermore none of them is backed by specimens to my knowledge. After all it is the normal behavior of animals in which we are interested, not the exceptions.

Diamond Light Ship and the Capes of the Carolinas on September 3, 1919. Haagner (1921) records that on September 1, 1920 a red bat was found on a ship inbound from South Africa, when she was three days out of Philadelphia. In this case there was no possibility that the bat had accompanied the ship away from the coast. Murphy and Nichols (1913) observed a bat, probably a silver-haired bat, five miles off Sandy Hook, N. J. on September 6, 1907. MacCoy (1930) reports a bat taken five miles N.N.W. of Provincetown, Mass. August 18, 1929, when it boarded a fishing vessel. Thomas (1921) collected two silver-haired bats and one red bat out of a flock of about 100 which "caught up with the ship twenty miles off the coast of North Carolina" on September 3, 1920. Finally Norton (1930) records that a red bat was taken on a ship at 42° N. latitude, 66° W. longitude, 240 miles east of Cape Cod and 130 miles S. × W. of Cape Sable, Nova Scotia on August 17th, 1929. Two additional records of bats at sea have recently come to my attention. Mr. D. F. Bumpus has presented to the Museum of Comparative Zoölogy three silver-haired bats which he captured on the *Atlantis* on August 25, 1938 at 39° 09′ N. lat., 70° 22′ W. long. (130 miles S. × E. of Nantucket Island, Mass.). Dr. N. T. Werthessen of the Boston Dispensary saw a bat at 45° 07′ N. lat. 42° 36′ W. long. on September 7, 1937 while eastbound on the S. S. American Banker. The bat flew within 15 or 20 feet but could not be captured. This bat was about 500 miles from Cape Race, Newfoundland, the nearest land. The ship was about 85 hours out of New York, and as the bat had not been seen previously it seems unlikely that it had been carried from New York on board the vessel. Small migrating land birds behave in exactly the same manner, and all of these records would be exceedingly difficult to explain, unless we assume that the tree bats are migrating down the coast in late August and September.

Allen (1921) gives evidence indicating that the tree bats are found in Bermuda during the autumn months but not at other seasons. In view of their usual northern breeding range it is very unlikely that the hoary and silver-haired bats breed in Bermuda. Jones (1884) writes as follows of the hoary bat, *Lasiurus cinereus:*

"According to the observations of Mr. J. L. Hurdis . . . who passed 14 years upon the islands . . . and during that lengthy period was a close observer of the habits of all animals which came under his notice, only two species of bat are known to visit the Bermudas, and that usually in the autumn and early months of the winter. The present species is observed occasionally at dusk during the autumn months . . .

but as it is never seen except at that particular season it is clear that it is not a resident . . . ."

If the tree bats do migrate between the mainland and Bermuda they must fly over 600 miles of open ocean.

Unfortunately the North American tree bats do not lend themselves to successful banding studies, which require that large numbers of individuals be marked in order that a few may later be recovered. These bats are neither numerous nor colonial, so that large numbers cannot be captured. However, Eisentraut (1936, 1937) was able to band 600 Noctules, *Nyctalus noctula*, a European genus not represented in the United States, but somewhat similar in its habits to the American tree bats. The noctules are large bats and strong fliers, but they are sufficiently gregarious that the 600 could be caught in a single building in Dresden, Germany, where they were spending the winter. Five of these bats were retaken later, all of them having flown north from their winter quarters. The most distant recovery was from a point in Lithuania 475 miles from Dresden. This seems to prove conclusively that the European *Nyctalus noctula* is capable of long migratory flights.

The indirect, circumstantial evidence discussed above is exactly paralleled by the behavior of migrating birds. They appear temporarily in large numbers at points along their route where they are unknown at other seasons, and they often alight on ships off the coast. Thus while we lack direct, conclusive banding evidence, it seems an almost inescapable conclusion that the North American tree bats perform annual migrations of several hundred miles to reach regions where insect food is available throughout the winter.

Migrations of Cave Bats

Cave bats, of which the most common is *Myotis l. lucifugus*, the little brown bat, are found throughout the United States and Canada up to the northern limits of the forests. Although they need not fly south in winter to a warmer climate, they must find suitable retreats in which to hibernate. These requirements for hibernation will determine their winter distribution.

Caves are certainly the typical hibernation quarters for bats. They remain at a low and constant temperature throughout the winter, and if they are large enough the bats are never subjected to freezing temperatures, which hibernating mammals can seldom survive (Johnson 1931; Merzbacher 1903; Rulot 1902). I have found that two hiber-

nating *Eptesicus f. fuscus* were killed if placed in an ice box where the temperature was about −5° C. Furthermore caves are usually very humid and this is an advantage if not a necessity, for bats kept in hibernation in a cold room will die of desiccation if some provision is not made to keep their surroundings nearly saturated with water vapor. Mine tunnels are equally suitable, of course, and many of the largest bat colonies in New England are in abandoned mines.

There are several records of bats hibernating in other situations. Johnson (1933) kept five *Eptesicus f. fuscus*, the big brown bat, hibernating in a room where the temperature was between 45° and 57° F. (average 51° F.). These bats lived a little over two months, but died in January having lost almost 50% of their weight. Swanson and Evans (1936) writing of Minnesota cave bats, record several instances where *Eptesicus f. fuscus* spent the winter in buildings. Mearns (1898) says of the little brown bat in the Hudson Highlands of New York, "I have found it dormant in hollow trees in winter." The writer found a group of Say bats, *Myotis keenii septentrionalis*, apparently hibernating in a well during December. During the winter months many bats are reported flying about in cities and inside large buildings. Most of these are big brown bats *Eptesicus f. fuscus*, which are apparently hardier than the smaller and more abundant *Myotis l. lucifugus*. Guthrie (1933) reports, (and I have noticed the same point) that *Eptesicus f. fuscus* is usually found in the colder, more exposed parts of caves, near the entrances for instance.

There are so many *Eptesicus* found each winter in the city of Boston that it seems certain that they must hibernate in heated buildings, finding, perhaps, some retreat where the temperature remains low and fairly constant. Wetmore (1936) kept an *Eptesicus* in an exposed but somewhat insulated box at Washington, D. C. all winter. The bat survived despite the fact that the temperature inside the box varied from −14° to 15.6° C. Swanson and Evans (1936) also report that *Eptesicus* hibernated successfully for three weeks at 27.6° F.

When one tries to keep bats hibernating in captivity it seems that the requirements for successful hibernation must be very restricted, especially for the smaller cave bats (genera *Myotis* and *Pipistrellus*). The temperature must be above freezing, but the bat's metabolic rate must not be so high that all its fat reserves oxidize before the winter is over. This seems to have been the fate of the *Eptesicus f. fuscus* which Johnson (1933) kept at an average of 51° F. The humidity must be high, but not complete saturation. It is difficult to imagine how these exacting requirements can be met during extreme fluctuations of

winter temperature except in inclosed spaces below ground. I have never found bats hibernating in mid-winter in caves less than 25 feet long and about five feet high. If such caves are not suitable, how can bats survive in retreats with such poor insulation as buildings, hollow trees or small crevices in the rocks? Certainly most of the bats found outside of caves in winter are in poor condition, and it is always possible that the bats which appear in winter in towns have chosen unsuitable hibernation quarters and are driven out by adverse conditions.

Except for *Eptesicus f. fuscus* it seems that very few of our cave bats hibernate successfully outside of caves or mines. This is not proven by any means, and the habits of bats have been studied so little that it is possible that some one may discover large numbers of them hibernating in totally unsuspected places. As will be made clear below, the banding evidence on the movements of cave bats throws some light on this problem.

Observation of cave bats had long ago led to the belief that they might be migratory. The typical summer colonies in buildings are deserted in winter (Sherman, 1929; Griffin, 1934; Eisentraut, 1934, 1936; Barret-Hamilton, 1910; Hugues, 1912). Caves in New England, although well populated with hibernating bats in winter are practically deserted during the summer months. Hahn (1908) and Mohr (1932c, 1933) noted fluctuations in the population of caves in Indiana and Pennsylvania respectively. They were led by this indirect evidence to believe that seasonal migrations were in progress, although it was not possible to trace them very definitely. Hugues (1912) and Casteret (1938) in France noted apparent shifts in the bat population from caves to summer colonies. Zimmerman (1937) reported the sudden appearance of a great concentration of *Myotis l. lucifugus*, suggesting that a mass movement of some sort was under way.

Guthrie (1933) studied seasonal fluctuations in the bat populations of two Missouri caves. *Myotis grisescens*, the little gray bat, (not found in New England) apparently wintered elsewhere but passed through the region studied "towards the end of April, but did not become a cave resident except temporarily at that time". A few weeks later, however, *Myotis grisescens* returned to the caves in large numbers and remained during the summer months. *Myotis sodalis* spent the winter in the caves in large numbers, but moved about considerably, apparently in correlation with changes in temperature. During the summer this bat left the caves altogether. *Myotis l. lucifugus* hibernates in the caves but leaves them for the summer.

This summary indicates the type of results which have been ob-

TABLE 1. CAVE BATS BANDED IN THE NEW ENGLAND REGION

Species	*N. H.*	*Vermont*	*Mass.*	*Conn.*	*New York*	*Total*
Eptesicus f. fuscus	39	38	56	34	8	165
Myotis l. lucifugus	178	1823	3735	1053	862	7651
Myotis keenii septentrionalis	...	141	614	266	123	1144
Myotis sodalis	...	2032	72	252	14	2370
Myotis subulatus leibii	...	10	....	1	....	11
Pipistrellus subflavus obscurus	...	60	70	149	119	398
Totals	217	4094	4547	1755	1126	11739

tained by direct observation of bat populations. It is evident that large scale movements are occurring, but the evidence obtained is limited.

If the vast majority of cave bats must hibernate in caves, natural or artificial, those which spend the summer in areas where there are no caves must obviously migrate to caves in another region. Eastern New England is an example of an area where caves large enough to shelter hibernating bats are practically non-existent. Since there are in western New England several caves where bats winter by the hundreds, it is logical to assume that an annual migration takes place between the two areas.

In 1932 I became interested in this problem, and realized that by banding large numbers of bats at both caves and summer colonies it might be possible definitely to demonstrate such a migration if it occurred. Since cave bats are colonial both in summer and winter, they can be banded in quantities that are out of the question with the far less abundant tree bats. It was felt that if such a migration could be demonstrated it would show that even the smallest of our bats and the weakest fliers were capable of long migratory flights (for summer colonies are sometimes several hundred miles from the nearest caves). In addition to its intrinsic interest, the proof of such a migration would be good indirect evidence for the longer migrations ascribed to the tree bats.

Methods and Procedure

The methods used were in principle very simple. Bats were caught and banded, complete records kept, and the recaptures of banded bats on subsequent visits to the colonies were tabulated and analysed. Since the area to be covered was large, the chance that bats would be retaken at a distance would have been vanishingly small, unless a very large number were banded. To date over 50 bats have been retaken at a different colony than the one where they were banded. Many of these had traveled no great distance, but others yielded significant records which will be presented below. Table 1 shows the numbers of each species banded in various states.

Practically all the bats were banded with No. 1 aluminum bird bands kindly furnished by the U. S. Bureau of Biological Survey. These bands, like all the bird bands used in the United States, bear a serial number on the outside and on the inside the inscription "Notify Biol. Surv. Wash. D. C." This is sufficient postal address for the Bureau, and any one finding a banded bird or bat is expected to send the band

or report the number to this Bureau, which keeps complete files showing when and where all bands were used. Many birds are reported each year by persons who accidently find them dead, but bats are so retiring in their habits and there is so much popular aversion to them that only 18 returns have been secured in this way. The most interesting recoveries have been obtained when banded bats were retaken at other colonies in the course of the regular banding work.

The bands are applied by closing them around the bat's hind leg and pinching them against the interfemoral membrane. A properly applied band, which is tight and does not move, seldom seems to injure the bats, and the high number of recoveries sometimes obtained shows that the method is fairly satisfactory. Often 80 or 90 percent of the bats banded in autumn in a cave will be retaken in the same cave later the same winter, showing that no very large mortality or loss of bands occurs. Plate 1 shows a bat with the band in position.

Other bat banders have sometimes used different methods. Eisentraut (1934) places aluminum bird bands around the bat's humerus. This method has the advantage that the band can be seen when the bats are in a compact cluster, whereas leg bands are only visible when the bats are handled individually. Hibernating bats hang head down from the rock, and they often form thick clusters like those shown in Plates 1 and 2 where there may be two or three hundred bats per square foot of rock surface. It has always seemed to me that the possibility of injury to the wing was serious, whereas slight damage to a leg is not so apt to be fatal. Mohr (1934) uses fingerling tags placed on the bats' ears, and this method also has the advantage of easy recognition. However the tags are so small that no return address can be stamped on them, and they are relatively expensive. Mohr (personal communication) has some fears that the tags may injure the bats, although my experience suggests that there is little to choose between the three methods. I have marked about 160 bats with wing bands and ear tags, and the percentage retaken has been as high or higher than with bats bearing leg bands.

The actual catching of bats is easy in caves. The bats are usually dormant and can be plucked from the walls by hand or with a net if out of reach. Often they retire into small deep crevices or into drill holes in mines and they must be extracted from such retreats with long metal forceps. Summer breeding colonies in buildings present more difficulties. Usually the bats spend the daytime inside the trim of frame buildings or in cracks between the rafters and roof boards. In most cases it is impossible to dislodge them without seriously damaging the

building itself. Therefore means had to be devised to catch the bats as they voluntarily left their roosts for the night's hunting.

One useful method was to nail U-shaped wire supports over the holes from which the bats emerged and to stretch cheese-cloth over this frame work, forming a tunnel of netting which could be led down to within reach of the ground. Typical "tunnel nets" of this type are shown in Plates 2 and 3. When the bats emerge they are presumably hungry, and perhaps the ones behind are pushing; at any rate they come with a rush and apparently do not see the netting until they strike it. Probably they are not expecting obstructions immediately below the hole they have flown out of so often. The bats will usually drop to the bottom of even long nets such as are shown in Plates 2 and 3. The one shown in Plate 2 caught 250 in a single evening.

These tunnel nets were so successful that an unexpected difficulty was encountered. The bats came so fast (200 in twenty minutes) that they could not be removed and placed in ordinary cages. Too much time was needed to open and close a cage door, or to open and close a bag without allowing the bats already inside to escape. Therefore an entirely new type of container was developed which had an opening at the top surrounded by smooth sheet metal so that the bats could not crawl up to the opening (see Plate 4). Since the bats cannot fly in the small space inside the container, the hole need not be closed and one can reach in at any time without fear of releasing bats already inside. The best size for these containers proved to be about 12 inches in diameter and 15 inches high. The metal tops must be absolutely smooth, without seams or rough spots. They can be made very economically from small milk strainers with the strainer netting removed.

By placing a cylindrical container of this sort with a relatively larger opening under a short tunnel net of cheese-cloth it is possible to make an automatic bat trap which will catch the bats as they leave their holes and will not require constant tending. Recent experience has shown that these traps can be greatly improved by making the smooth upper section of transparent celluloid. This is not so conspicuous as netting or sheet metal and the bats enter such a trap more readily. Plate 5 shows one of these celluloid traps in position. These bat traps are shown in Plates 3 and 4. Four such traps, covering the principal exits by which bats left the building shown in Plates 2 and 4, took 350 bats in one evening. When the bats use many holes in a building it is best to plug with newspaper or cloth those holes not covered by traps.

From a knowledge of bird migrations it is possible to predict what

one might expect if cave bats do have definite annual migrations from caves to distant summer colonies. Migratory birds usually return each year to the same breeding area, although this in itself is no proof of migration, as a resident population might also be found each year in the same breeding grounds. In addition migratory birds always seem to have a well developed "homing instinct". If they are carried away, they tend to return sooner or later to the place where they were originally taken. The development of a good homing ability seems to be correlated with the habit of migration. Thus if New England cave bats were migratory we might expect to find: (a) that a large proportion of them returned each year to the same caves and breeding colonies, (b) that if bats were artificially carried away from the caves or buildings where they were caught, they would return, and (c) that some which were banded in caves would later be retaken in summer colonies or *vice versa*. It is pertinent to consider the recoveries of banded bats which have been obtained by various investigators from these points of view.

Terminology will be borrowed from bird banding to describe different types of recoveries of banded bats. A *return* is any recapture of a banded individual at another locality, or a recapture at the same locality where it was banded, after the passage of a season when the animals are believed to be migrating. If the bat has moved from one locality to another it is called a *foreign return*. If it is retaken at the point where it was banded after a seasonal absence, it is known as a *local return*.

(a) *Local returns.*

In 1916 (the earliest bat banding on record) A. A. Allen (1921) marked four female *Pipistrellus subflavus* which had been caught in a building at Ithaca, N. Y. Three years later three of the four were retaken in exactly the same spot. Mohr (1934, 1936) and Poole (1932) have marked several hundred bats in Pennsylvania, and the percentage of local returns was 20% to 40%, Eisentraut (1934, 1935, 1936) has banded about 6000 European cave bats, mostly *Myotis myotis*, in caves near Berlin. He found that the percentage of local returns was about 30%. In certain parts of the caves where most of the bats could be captured, the percentage was sometimes as high as 50%.

At two caves in Vermont where it is possible to catch all the bats, I have retaken an average of 36.7% and 56.8% respectively during the two winters following the date of banding. These figures include both *Myotis l. lucifugus* and *Myotis sodalis*. These percentages are variable

and would be higher if it were not so difficult to catch all the bats in a colony. The influence of bats overlooked and of the natural mortality is discussed in Appendix I. The important point to keep in mind is that if every surviving bat returned, the fraction of them most likely to be retaken will be the *product* of the fractions of the total number present which are taken on each visit. As explained more fully in Appendix I the percentages quoted above probably indicate that a substantial proportion of the bats surviving the summer return each winter to the same cave to hibernate.

At summer colonies the percentages recovered are lower, both because it is much more difficult to catch all the bats in a building,[1] and because the bats are more likely to move from one summer colony to another. . . . Of 1047 *Myotis l. lucifugus* banded at summer colonies on Cape Cod, Mass., 111 or 10.5% have been retaken later at the same building. This should be compared with an average percentage of 25% to 30% local returns to caves. At summer colonies an average of 13.4 out of every thousand *Myotis l. lucifugus* banded were retaken as foreign returns at another colony a few miles distant, while there were only 1.7 foreign returns recorded out of every thousand bats banded in caves.[2]

Thus the New England cave bats seem to have a definite tendency to return successive years to the same colony, and this tendency is more highly developed at the caves than at the summer colonies in buildings.

(b) *Homing Experiments.*

Almost every bat bander has carried some bats to a distance from their home roost before releasing them; (see Howell and Little (1924), Mohr (1934), Eisentraut (1934, 1936), Casteret (1938). I have summarized the results of all homing experiments in tabular form in Table 2 in so far as the data at hand permit. To shorten the table I have grouped together the bats from the same colony released at the same point, even though they may have been transported during different seasons. The last column of the table requires some explanation. It is

[1] Using the terminology developed in Appendix I, c_1 and c_2 are small, so that P is much smaller than F.

[2] The majority of bats which have been recorded as foreign returns moving from one cave to another originated in a cave at East Dorset, Vt. This cave has a very large entrance and it evidently becomes too cold for bats in mid-winter. Although three or four hundred bats may be found there in November, there have never been nearly so many in April. A few dead bats are always found in late winter, sometimes frozen into the large stalactites and stalagmites which grow up in the cave as ground water seeps through the roof and freezes. Evidently the bats which try this cave one winter are very likely to move elsewhere if they survive. Only 18 bats banded in this cave have been recorded as returns of any sort, and 10 of these 18 were foreign returns. If this cave is neglected as atypical, the number of foreign returns per thousand bats banded falls to 0.7.

(S) = summer colony; (W) = cave

Species	*Locality Captured*	*Experimenter*	*Distance transported (miles)*	*Number transported*	*Number Retaken*	*% of transported bats retaken*	*% of local releases retaken*
Eptesicus f. fuscus	Covina, Cal. (S)	Howell and Little (1924)	20	5	2	40.0%	.....
" " "	W. Andover, Mass. (S)	Griffin	19	6	5	83.3%	57.7%
Myotis myotis	Berlin, Germany (W)	Eisentaut (1936)	26	40	9	22.5%	32.8%
" "	" "	"	95	22	1	4.5%	32.8%
Miniopterus schreibersii	Hautes-Pyrenees, France (S)	Casteret (1938)	10	138	42	30.4%	.....
M. schreibersii & Myotis myotis	" "	"	21	66	18	27.3%	.....
M. schreibersii & Myotis myotis	" "	"	62	115	6	5.2%	.....
Myotis myotis	" "	"	10	1	1	100.0%	.....
" "	" "	"	124	17	1	5.9%	.....
Myotis l. lucifugus	Kempton, Penn.	Mohr (1934)	1 to 30	51	12	23.5%	.....
" " "	Kutztown, Penn.	Poole (1932)	18	10	6	60.0%	.....
" " "	Pricetown, Penn. (S)	"	10	20	4	20.0%	.....
" " "	Hatchville, Mass. (S)	Griffin	12	22	4	17.4%	10.5%
" " "	" "	"	3	9	2	22.2%	14.7%
" " "	" "	"	33	2	1	50.0%	27.2%
" " "	Mashpee, Mass. (S)	"	10	140	17	12.1%	11.5%
" " "	" "	"	12	2	0	0	11.5%
" " "	" "	"	36 (at sea)	24	6	25.0%	14.4%
" " "	" "	"	24	5	1	20.0%	8.1%
" " "	" "	"	66	49	2	4.1%	8.1%
" " "	Cotuit, Mass. (S)	"	12	45	10	22.5%	25.6%
" " "	" "	"	3	10	3	30.0%	25.6%
" " "	Chittenden, Vt. (W)	"	20	10	2	20.0%	50.0%
Myotis sodalis	" "	"	20	35	10	28.6%	23.8%
Myotis l. lucifugus	Roxbury, Conn. (W)	"	156	82	7	8.5%	30.7%
Myotis sodalis	" "	"	156	44	2	4.5%	31.4%

valuable for comparative purposes to know how many of the bats from a given colony, *which were released where they were caught*, were later retaken. These bats are spoken of as "local releases," and they constitute the majority of the bats banded. The percentage of local returns from the local releases varies widely, but the significant point, in my opinion, is that in almost every case the bats which I have released at a distance were as likely to be retaken as the local releases. This is shown graphically in text fig. 1, where the solid bars represent local releases and the outlined bars show the percentage of transported bats retaken.

The fact that in almost every case more transported bats were retaken than local releases is worth noting, but is probably not significant. The base of text fig. 1 shows that this difference was fairly sizeable, when all the bats from different colonies are totalled together. The process of being banded probably frightens and disturbs the bats, and when released locally many of them desert the roost where they were caught and move to another colony. For some reason those carried to a distance seem to be less likely to associate the discomfort of being banded with the home roost.

The relation between distance transported and percentage retaken is interesting, but the data available are insufficient to warrant definite conclusions. Only when the distance transported exceeded 50 miles did the percentage retaken fall far below the control figure afforded by the local releases.

None of my homing experiments give any precise indication of the speed of homing. Usually I did not visit the colonies more than two or three times during the summer, as too much attention causes the bats to move elsewhere. Therefore most of these homing returns were obtained during subsequent seasons. A few bats transported short distances have been retaken at their home colony during the same season, and one carried 66 miles away was retaken ten weeks later at another summer colony two miles distant from where it had been caught and banded. Mohr (1934) records 3 bats which returned 30 miles in 12 days.

In the case of the big brown bat, *Eptesicus f. fuscus*, I have one rather surprising homing record. Five bats of this species were transported 19 miles, photographed and released (one of them is shown in Plate 1). In spite of considerable rough handling which they received, every one was retaken when their home roost was revisited 36 days later.

There are two records at hand of bats which were transported and were later retaken at points on a direct line between the place of cap-

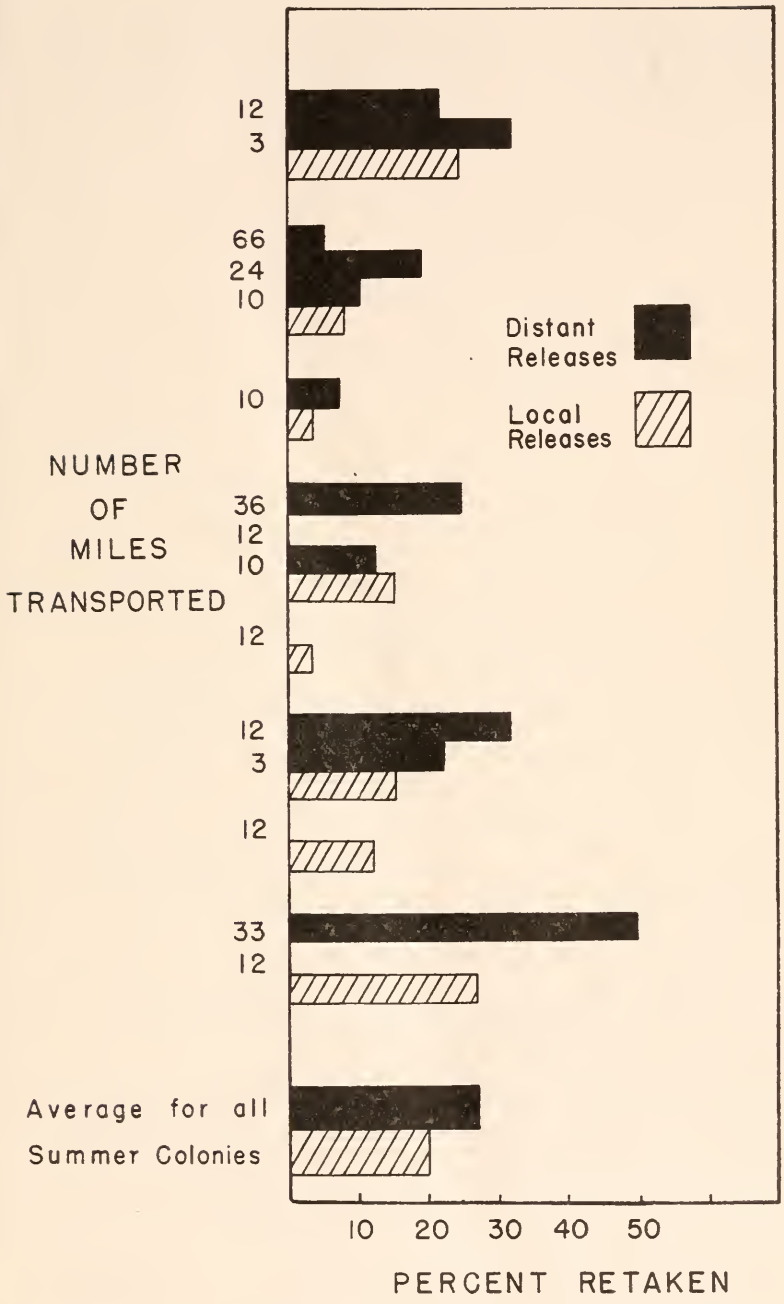
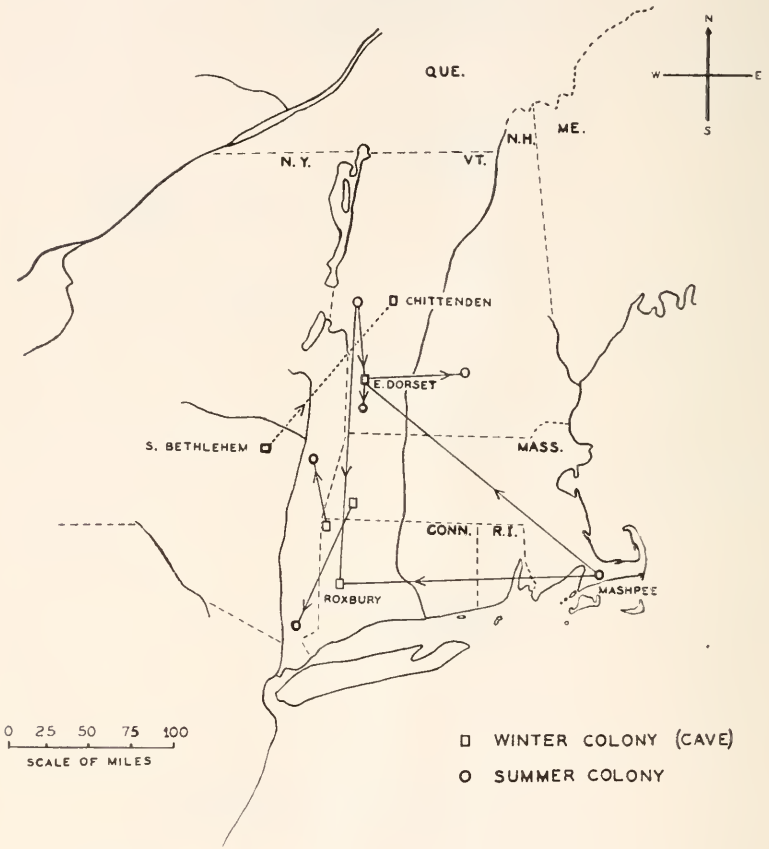


Fig. 1. Recoveries at home roost of local and distant releases of *Myotis l. lucifugus* from various summer colonies on Cape Cod, Mass.

ture and release. A bat carried 62 miles by Casteret (1938) was taken 12 miles from its home cave on a direct line with the point of release. A *Myotis l. lucifugus* was transported 168 miles from Roxbury, Conn.



Text fig. 2. Movements of Banded Bats: *Myotis l. lucifugus* (Arrows indicate direction of flight)

to Chittenden, Vt. and was retaken the next winter at East Dorset, Vt., 118 miles north of Roxbury, Conn. These bats, at least, were apparently traveling directly in the direction of their goal.

These homing experiments seem to satisfy amply the second criterion

TABLE 3. FOREIGN RETURNS OF BANDED BATS I

Bats which flew from one cave to another.

Species	*Sex Number*	*Place Banded*	*Date Banded*	*Place Retaken*	*Date Retaken*	*Distance*	*Direction of Flight*
Myotis lucifugus							
lucifugus	38-60869	Roxbury, Ct.	Apr., 1937	Ancram, N. Y.	Feb., 1938	37 miles	N.N.W.
" "	H45482	Chester, Mass.	Feb., 1937	Roxbury, Ct.	Apr., 1937	55 "	S. × W.
" "	H42723	E. Dorset, Vt.	Apr., 1936	Chittenden, Vt.	Apr., 1938	35 "	N. × E.
" "	38-24806	S. Bethlehem, N. Y.	Nov., 1937	Chittenden, Vt.	Apr., 1938	120 "	N.E.
Myotis sodalis	H40997	E. Dorset, Vt.	Nov., 1934	Plymouth, Vt.	Nov., 1935	28 "	N.E.
" "	H40878	" " "	" "	" "	Dec., 1935	28 "	N.E.
" "	H40891	" " "	" "	" "	Apr., 1937	28 "	N.E.
" "	H42593	" " "	Apr., 1936	Roxbury, Ct.	Apr., 1937	135 "	S.
" "	38-25211	" " "	Apr., 1937	" "	Apr., 1938	135 "	S.
" "	38-25290	" " "	Apr., 1937	" "	Feb., 1938	135 "	S.
" "	H42249	Chittenden, Vt.	Nov., 1935	Plymouth, Vt.	Nov., 1936	21 "	S.E.
" "	H42413	" "	Nov., 1935	E. Dorset, Vt.	" "	35 "	S. × W.
" "	37-60124	" "	Apr., 1937	Ancram, N. Y.	Feb., 1938	142 "	S. × W.
Myotis keenii	H45413	Chester, Mass.	Feb., 1937	Roxbury, Ct.	Apr., 1937	55 "	S. × W.

advanced above as indicating migratory habits; there can be little doubt that the cave bats have a well developed homing instinct.

(c) *Foreign Returns.*

The recapture of banded bats which have actually migrated constitutes the most satisfactory type of evidence which we can hope to obtain. As mentioned above, the *Myotis l. lucifugus* at summer colonies on Cape Cod, Mass. move occasionally from one building to another. But since these colonies are only five miles apart, occasional shifts are not surprising. Bats are less likely to move voluntarily from one cave to another, and only 8 have been recorded as foreign returns (excluding the atypical E. Dorset colony for reasons explained in footnote 2, page 230) as compared with 979 which have been taken as local returns. These 14 foreign returns from cave to cave present no unified picture and, with one possible exception mentioned below, they are probably the result of occasional random wanderings. Eisentraut (1936) likewise found that out of 6000 cave bats (mostly *Myotis myotis*) banded in two caves 26 miles apart, only 0.2% moved voluntarily from one cave to the other. Table 3 shows the details of these flights from one cave to another.

No less than 102 (1.8%) of the 5657 *Myotis myotis* banded by Eisentraut (1936) in caves near Berlin were retaken during the summer, almost all at points to the north and east of the caves where they were banded. The distances between caves and summer colonies ranged from one half to 100 miles.

Text fig. 2 shows the points of banding and recapture of the seven foreign returns of *Myotis l. lucifugus* which have been obtained between caves and summer colonies, and Table 4 gives these returns in tabular form. In most cases the summer colony was north or east of the cave, as would be expected in New England since the large caveless areas are near the coast while the limestone belt containing all of the caves is on the western border of the district. The longest distance which a cave bat has been definitely traced by the recovery of a banded individual is 168 miles (Mashpee, Mass. to East Dorset, Vt.).

One other foreign return should be mentioned here. A *Myotis l. lucifugus* banded at South Bethlehem, N. Y. in November 1937 was retaken at Chittenden, Vt. on April 10, 1938, having flown northeastward 120 miles during the interval. Perhaps this bat was beginning his spring migration in early April by moving from cave to cave during brief spells of warm weather. This flight is shown by a broken line in Text fig. 2. Bats bearing bands numbered H45482 and H45413 also flew 55 miles from one cave to another during the winter months.

TABLE 4. FOREIGN RETURNS OF BANDED BATS II

Bats which migrated from cave to summer colony or vice versa.

Species	*Sex Number*	*Place Banded*	*Type of Colony*	*Date Banded*	*Place Retaken*	*Type of Colony*	*Date Retaken*	*Distance Flown*	*Direction of Flight*
Myotis lucifugus lucifugus	H43269	Mashpee, Mass.	Summer	June, 1936	Roxbury, Ct.	Cave	Nov., 1937	160 miles	W.
" "	H43413	Cotuit, Mass.	"	July, 1936	E. Dorset, Vt.	"	Nov., 1936	169 "	N.W.
" "	H43617	Mashpee, Mass.	"	July, 1936	E. Dorset, Vt.	"	Nov., 1936	168 "	N.W.
" "	H43664	Mashpee, Mass.	"	Aug., 1936	E. Dorset, Vt.	"	Apr., 1937	168 "	N.W.
" "	H46232	Mashpee, Mass.	"	July, 1937	E. Dorset, Vt.	"	Dec., 1937	168 "	N.W.
" "	H43579	Lake Bomoseen, Vermont	"	July, 1936	E. Dorset, Vt.	"	Nov., 1938	28 "	S. × E.
" "	H43755	Hubbardton, Vt.	"	Sept., 1936	Roxbury, Ct.	"	Apr., 1937	155 "	S.
" "	37-709898	Salisbury, Conn.	Cave	Apr., 1937	Rider's Mills, New York	Summer	Aug., 1937	30 "	N.N.W.
" "	38-25354	E. Dorset, Vt.	Cave	Dec., 1937	Henniker, N. H.	"	? 1938	62 "	E.N.E.
Myotis sodalis	38-25282	E. Dorset, Vt.	"	Dec., 1937	Shaftsbury, Vt.	"	May, 1938	20 "	S.
Pipistrellus subflavus	37-60815	Sheffield, Mass.	"	Apr., 1937	Katonah, N. Y.	"	? 1938	85 "	S.S.W.

One big brown bat, *Eptesicus f. fuscus,* banded during hibernation in a mine at Roxbury, Conn. was retaken the following summer at Washington, Conn. about 10 miles to the northwest. This one record is consistent with the assumption, justified above on other grounds, that this species does not migrate long distances.

These foreign returns are too few in number to prove anything conclusive about the New England bat population as a whole, for they might represent atypical cases. Nevertheless it is certain that even the small cave bats do sometimes fly several hundred miles to reach suitable caves for their hibernation. Thus it is not necessary to assume that cave bats must be able to hibernate outside of caves, simply because they are found in summer in regions where caves do not exist. It is quite possible that the majority of the banded bats migrated much farther than those recovered, and spent one season entirely outside of the area studied. I feel reasonably sure that there are few good bat caves in western New England, which I have not visited. If the bats I have banded in New England summer colonies do hibernate in caves in this area it is surprising that so few have been retaken. During the next year or two, while most of these bats are still alive, naturalists in neighboring states and provinces have a unique opportunity to secure some extremely significant returns by searching caves and summer colonies for banded bats.

Summary and Conclusions

In the United States the tree bats (*Lasiurus borealis, Lasiurus cinereus* and *Lasionycteris noctivagans*), which do not normally hibernate, fly south from their breeding range in northern United States and Canada to the southern States where insect food is available throughout the year. The hoary bat[1] probably flies regularly to Bermuda and the other two tree bats may sometimes do so.

The big brown bat, *Eptesicus f. fuscus,* is very hardy and can apparently hibernate outside of caves even in winter climates as severe as those of New England and Minnesota. There is little evidence that it migrates any great distance, but it has a definite homing instinct when transported 19 or 20 miles from its home roost.

Recoveries of banded bats have shown conclusively that during the winter months *Myotis l. lucifugus* and *Myotis keenii septentrionalis* occasionally travel as far as 120 miles from one cave to another.

[1] *Lasiurus cinereus.*

The smaller cave bats (genera *Myotis* and *Pipistrellus*) have a strong homing instinct when released up to 50 miles from the point where they were taken, and some have returned when transported as much as 156 miles. These species probably return in winter to caves even though this may involve a migration of 150 to 200 miles from their summer range. Two species of *Myotis*, in Europe and in New England, have been definitely traced by recoveries of banded individuals from caves to summer colonies as much as 166 miles apart.

The evidence available, taken as a whole, is sufficient to indicate very strongly that bats of several genera in both Europe and North America perform annual migrations as extensive as those of many migratory birds.

APPENDIX I.

A method of analysing local returns of banded bats

The following is a very simple statistical consideration of the banded bats retaken at the place of banding during subsequent seasons. It is possible under certain conditions to compute the number actually returning to a colony from the percentage retaken. This treatment could perhaps be profitably applied to the local returns obtained by marking birds or other animals.

Consider a population of bats wintering in a cave, and assume that the population is constant, that is: the annual mortality of adult bats equals the number of young surviving until winter.

Call F the fraction of the bats banded one winter which *return* the next winter to the cave under consideration.

Call P the fraction of the bats banded the first year which are *retaken* at the cave the next season.

Call Sa the fraction of the bats banded (adults) which *survive* until the next winter.

Call C_1 the fraction of all the bats present which are banded the first winter.

Call C_2 the fraction of the bats present which are caught the second winter.

Call Y the average number of bats born each year per adult.
and
Call Sy the fraction of the young born which survive until winter.

Now obviously, if all the bats still alive return to the cave: $F = Sa$

and if all bats present are caught on each visit: $C_1 = C_2 = 1$

and $P = F = Sa$

but in the general case where C_1 & $C_2 \neq 1$ (some bats not caught) $P = C_1\ C_2\ F = C_1\ C_2\ Sa$

Since the total population is constant: $Sa = 1 - YSy$

therefore if all surviving bats return to the same cave the next winter: $P = C_1\ C_2\ (1 - YSy)$

or in the general case: $P = F\ C_1\ C_2\ (1 - YSy)$

Ordinarily $C_1 = C_2$ (on the average) so that we may write: $P = F\ C_1^2\ (1 - YSy)$

The quantities C_1, C_2, Y and Sy can be estimated and a maximum value for P be thus obtained which will be the fraction we might expect to recapture if all surviving bats returned to the cave where they were banded (i. e. $f = 1$).

For *Myotis l. lucifugus* Y is probably 0.5 (one young per year assuming monogamy and assuming that all adults breed). C_1 & C_2 vary with the cave, probably being about 0.95 at a small cave like the one near Plymouth, Vt., and perhaps about 0.7 at a large mine like the one at Roxbury, Conn. Sy is the most questionable of all, but a value of 0.7 seems a fair approximation considering what a "safe" life the bats lead.

Substituting these admittedly conjectural values we obtain:

For Plymouth, Vt. cave: $P = F \times (0.95)^2\ (1 - 0.5 \times 0.7) = 0.585\ F$

actual value for P at Plymouth cave was: $P = 0.568$

$$F = \frac{0.568}{0.585} = 0.97$$

For Roxbury, Conn. mine: $P = F \times 0.7^2\ (1 - 0.5 \times 0.7) = 0.32\ F$

actual value: $P = 0.31$

$\therefore$ $F = 0.97$

(i.e. F = approximately 1, or all surviving bats returned to these caves).

However, not all colonies yielded return percentages so nearly coinciding with the estimated values for P obtained by setting F equal to 1.

These considerations, not obvious at first glance, show that even recovery percentages as low as 30% may indicate an almost perfect tendency for bats to return to a colony successive seasons. This may

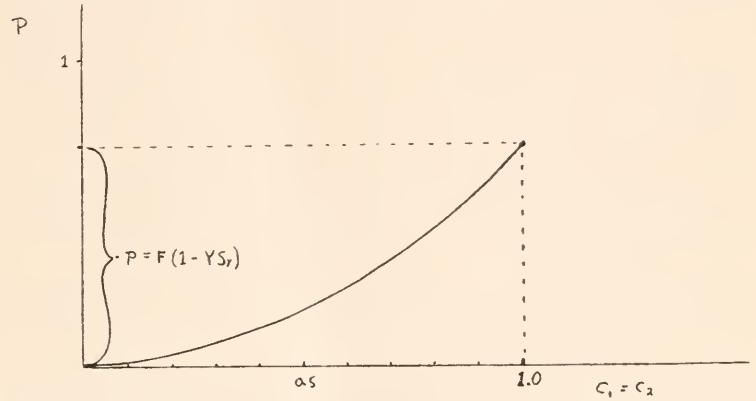


Fig. 3. Theoretical relation between P and C_1; other variables constant.

be represented graphically by plotting P against $C_1 = C_2$, holding the other variables constant so as to obtain a simple function. Such a curve is shown below, and it enables one to visualize graphically the fact that P, the percentage retaken, varies as the *square* of C_1 and hence approaches a constant value, distinctly less than 1 as C_1 approaches unity.

It is not claimed that the actual figures here presented are consistant, typical or significant, nor that the estimated values for such quantities as Sy are anything but rough approximations. The main purpose of this treatment is to present a method of analysing the data obtained from local returns so that the critical factors may be appreciated and the fullest possible significance may be perceived in whatever data may be available.

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EXPLANATION OF PLATES

PLATE 1

PLATE 1

Fig. 1. Small cluster of *Myotis l. lucifugus* hanging from the roof of a cave.

Fig. 2. Big brown bat (*Eptesicus f. fuscus*) in flight, showing band in position.

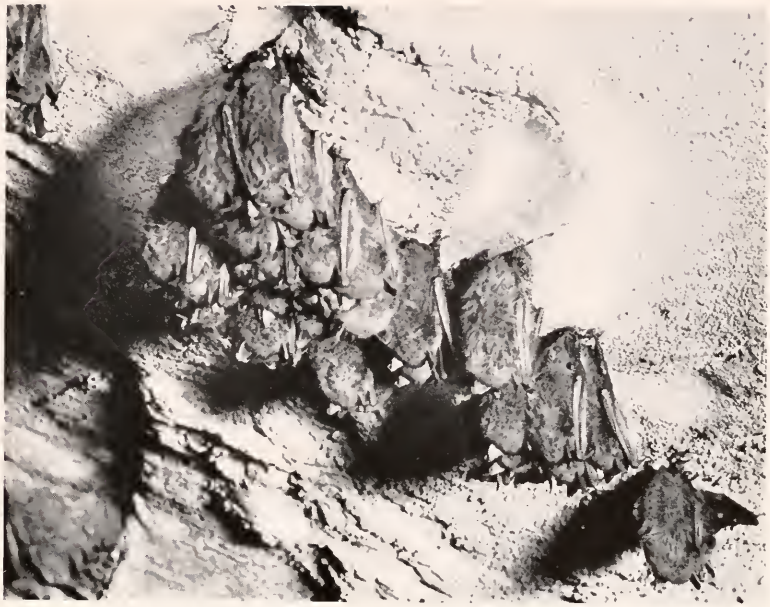

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PLATE 2

PLATE 2

Fig. 1. Typical Cluster of *Myotis l. lucifugus* and *Myotis sodalis* hanging from the roof of a cave during hibernation.

Fig. 2. Tunnel Net on summer roost of *Myotis l. lucifugus*.

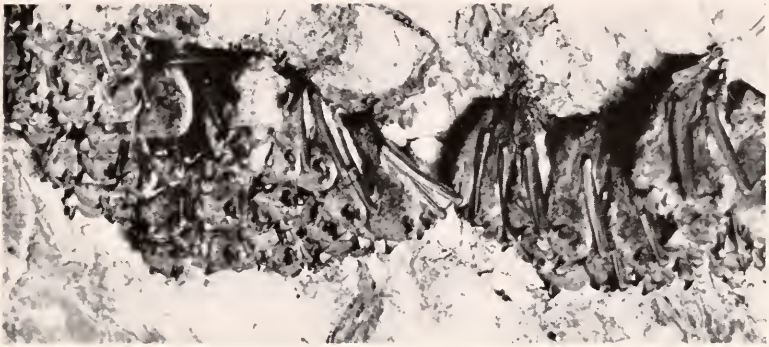

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PLATE 3

PLATE 3

Fig. 1. Tunnel Net used to catch bats spending the daytime in a crevice in the trim extending along the whole end of the roof.

Fig. 2. Automatic bat trap in position. The bats came out for their evening hunting from a hole at "A." This hole was connected by cheese-cloth to the smooth metal container "B." When the bats emerged, they fell to the bottom of the container and were unable to climb back beyond the smooth metal.

1

2

PLATE 4

PLATE 4

Fig. 1. Container to hold bats temporarily. Smooth metal top prevents climbing out. Capacity without crowding: 200 bats.

Fig. 2. Two automatic bat traps covering holes between the trim and bricks of a chimney. Cheese-cloth guides the bats into the containers.

1

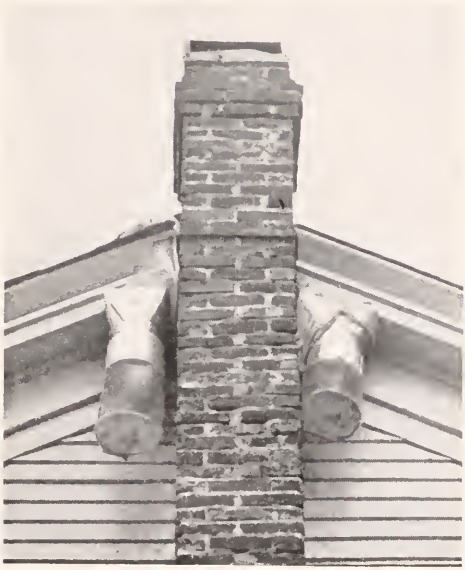

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PLATE 5

PLATE 5

Celluloid bat trap in position with one evening's catch.

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VOL. LXXXVI, No. 7

CUBAN SPIDERS IN THE MUSEUM OF COMPARATIVE ZOOLOGY

BY ELIZABETH B. BRYANT

WITH 22 PLATES

CAMBRIDGE, MASS., U. S. A.
PRINTED FOR THE MUSEUM
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By Elizabeth B. Bryant

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INTRODUCTION

Previous Investigations

Until recent years the spider fauna of the West Indies has received little attention. Some collections from St. Vincent, Dominica, Jamaica, Haiti and the Barbadoes have been made and the new species described by various workers. In 1925 Dr. Petrunkevitch spent five months on Puerto Rico, and the results of his collecting was published in the Trans. Conn. Acad. in 1929–1931. This was the first extensive collection from any of the islands. Cuba has received but scant attention. Probably the first naturalist to collect there was W. S. MacLeay, an Englishman, who spent several years at Guanabacoa. He figured and described in 1839 a few species he collected there. Later, several European arachnologists from time to time included in their writings descriptions of Cuban species. Baron de Walckenaer in his Histoire Naturelle des Insectes, 1837, described several that were in the Paris Museum. In 1857, Lucas wrote "Arachnides", in Ramon de Sagra, "Histoire physique, politique et naturelle de l'île de Cuba;" this is little more than a list of twelve species, although six were described and figured as new. Nearly thirty years later, the Peckhams began publishing their numerous papers on Attidae, through which are scattered descriptions of a few Cuban species. In 1909, Mr. N. Banks published a short paper on the "Arachnida of Cuba" in the Second Report of the Central Experimental Station of Cuba. This contains descriptions of eleven new species, as well as a list of a hundred that were recorded for the first time. It is based on material in the National Museum collected by Palmer and Riley in 1900 and by Schwarz in 1902 and on material sent him by C. F. Baker from Santiago de las Vegas. This paper has often been overlooked, as the publication had a limited circulation. In 1911, M. Sanchez Roig began the publication of "Los Aracnidos de la Isla de Cuba" in the Revista de la Facultad de Letras y Ciencias, Universidad de Habana. This was based on Banks' paper but unfortunately was never completed. The unpublished part of the manuscript remains in the custody of the University and may be consulted in its library.

During a trip to Cuba in 1913, Leng and Lutz made a small collection of spiders for the American Museum of Natural History, and the new species were described by Banks the following year. A year later, Lutz published a "List of Greater Antillean Spiders", in which Cuba is credited with some eighty-odd genera.

In 1926, Father Pelegrin Franganillo Balboa, S. J. published the first of a series of papers based on his studies. The final results appeared in 1936 under the title of "Los Aracnidos de Cuba hasta 1936", (Havana 1936). It is to be regretted that this much needed and most useful pioneer work should have its value impaired by the omission, through some oversight, of the dates when the various species were first described. The fact that species denoted as "spec. nov." in this paper were actually described by Father Franganillo as early as 1926, cannot fail to lead to confusion and controversy, unless the greatest caution is observed; this situation is doubly serious since, as the author has himself pointed out, the earlier descriptions appeared in journals of very restricted circulation. But that fact cannot justify the republication of these species as "spec. nov." at this later date.

The Museum of Comparative Zoology's collection is very rich in Cuban material. Among its earliest accessions are a few from Professor Poey, a famous collector of insects in the middle of the nineteenth century. In 1908, the Peckham Collection of Attidae was added to the Museum. Besides the identified material used in their papers, this contained a small collection from H. S. Parish made near Holguín, Oriente. Some had been sorted into genera by the Peckhams, and a few of the more common species determined. The Banks Collection was received in 1916. This contained most of the material used by Mr. Banks in the preparation of his paper on the "Arachnida of Cuba" (1909), as well as specimens received later from C. F. Baker, collected in the region about Santiago de las Vegas, Havana. The greater part of the Attidae in the Banks Collection had been identified by the Peckhams.

In recent years much material has been added, mainly as the result of Dr. Barbour's activities. He not only collected a great deal during his many trips to the island, but also has been instrumental in interesting others in the spider fauna. He employed Señor F. Cervera to collect material from the vicinity of Havana, Mr. C. T. Ramsden has given him a small but most interesting collection from the country about Guantánamo, Oriente, and to Professor Victor Rodriguez Ferrer we are indebted for several small species from Siboney.

Thanks to the energy and interest of students and others who have visited the Harvard Station at Soledad, many spiders naturally found their way to the Museum. Not only do these collections cover a wide and diversified area, but more important, perhaps, is the fact that practically every month of the year is represented. During the late winter and spring of 1925, Drs. George Salt and J. G. Myers made

collections at Soledad and in the Trinidad Mountains. Mr. Banks and Dr. L. G. Worley spent the month of August, 1931 there and returned with much material, including many small species usually overlooked. During July, 1932, Dr. O. Marston Bates and A. G. B. Fairchild added some very remarkable material from the vicinity of Soledad, using the Berlese funnel. But in point of numbers and importance, the collections made by Dr. P. J. Darlington, Jr. have added more than any other. The first collections were made about Soledad and the surrounding territory in 1926, but many more specimens and also species came in 1936, when Dr. Darlington worked at many localities in Oriente. This area was previously unrepresented in the collection except for a small collection sent in 1935 by Dr. S. C. Bruner from the Sierra de Cobre, a locality from which Father Franganillo had received much of his material.

As to the origin of the spider fauna of Cuba, nothing very definite can be postulated from present knowledge. Too little is known of the coastal area from Florida through Central America and as Mr. Banks pointed out in 1909, Yucatan is as near Cuba as is Florida, so it may well be that some species now known from Cuba may also occur in that little explored region.

That each island has an indigenous fauna is seen by comparing the species of Cuba and Puerto Rico, the only other island of the West Indies that has been carefully studied. In 1929–1931, Dr. Petrunkevitch published his admirable work on that island, based on collections made during a five months visit, with added material from the American Museum and the National Museum. 174 species and subspecies were fully described, of which 72 were new. In view of the fact that Cuba is several times larger and has much more varied country, undoubtedly it will have more than double the number of species reported here, when collections from other localities have been examined.

The following list tabulates the number of species by families reported from the two islands.

	Cuba	*Puerto Rico*	*Common to Both*
Dipluridae	1	2	0
Barychelidae	1	0	0
Theraphosidae	4	6	0
Filistatidae	2	1	1
Dysderidae	1	1	0
Oonopidae	8	5	4
Caponiidae	2	0	0

	Cuba	*Puerto Rico*	*Common to Both*
Oecobiidae	1	1	1
Agelenidae	1	1	0
Hersiliidae	1	0	0
Palpimanidae	1	1	0
Pisauridae	3	2	1
Lycosidae	8	4	2
Oxyopidae	4	3	3
Leptonetidae	0	1	0
Sicariidae	5	4	3
Pholcidae	12	11	4
Dictynidae	3	1	0
Theridiidae	31	23	13
Linyphiidae	7	4	0
Uloboridae	5	3	2
Deinopidae	1	1	1
Argiopidae	64	48	25
Mimetidae	2	2	1
Ctenidae	7	2	0
Gnaphosidae	10	1	0
Sparassidae	4	5	1
Selenopidae	5	3	1
Thomisidae	8	4	1
Aphantochilidae	1	0	0
Clubionidae	35	19	6
Salticidae	42	15	3
	280	173	73

That there are remnants of a very ancient fauna in Cuba is indicated by the presence of *Tetrablemma cambridgei* Bryant, a very primitive four-eyed species of less than a millimeter in length. The genus is known from three species, the genotype being from Ceylon and the second species from Australia. Also three genera known only from Venezuela have been found in the Oriente, e.g. *Triaeris*, (Oonopidae), *Temnida*, (Clubionidae) and the new genus *Lucarachna*, (Argiopidae). Recently Dr. Darlington has shown, (Quart. Rev. Biology, **13**, 1938, pp. 274–300), that it is not improbable that in an earlier geological age, the water area between Cuba and the mainland was much narrower, and it is possible that small forms were carried across by hurricanes to

the Greater Antilles from the mainland. That small spiders are found in the air at great elevations in calm weather and may be carried a great distance, are well recognized facts. In 1928, Dr. Petrunkevitch published a brief note, (Science, vol. 68, p. 65), on the Antillean spider fauna, stating "the fauna of the Lesser Antilles has South America and particularly Venezuela for its origin, and developed along the paths of air currents, especially of hurricanes. In Puerto Rico we find the last traces of this fauna, admixed to the fauna which came from the west." This view may well be modified, when the fauna of the separate islands is better known.

In the preparation of this paper, 280 species have been seen of which 92 are new. All the material used in this study is in the collection of the Museum of Comparative Zoology, with the exception of one species which was kindly loaned by the late Dr. C. S. Crosby, for whose help and advice I feel the greatest gratitude. Sincere thanks are due to Dr. Petrunkevitch for the gift of several species that are common to Puerto Rico and Cuba and to Dr. Louis Fage of the Paris Museum for the loan of *Cyclosa oculata* from the Simon Collection. I also wish to express my sincerest appreciation to Mr. Banks for his unfailing interest and assistance, without which the work of completing this paper would have been much more arduous.

In arrangement of families, the classification of Petrunkevitch's "Systema Aranearum" (1928) has been followed, since it includes all spider genera known up to that time and is the one at present used in the Zoological Record.

SYSTEMATIC LIST

Sub-order MYGALOMORPHAE

Only three of the eight families belonging to this sub-order are as yet reported from Cuba. Many species have been described from the island and many more have been recorded but only six species have been seen by me.

Family DIPLURIDAE

Sub-family MACROTHELINAE

Genus Ischnothele Ausserer 1875

Ischnothele longicauda Franganillo

Ischnothele longicauda Franganillo, 1936, p. 17, figs. 2, 3. (♀, Cuba, Loma del Gato, etc., Franganillo Coll.)
Ischnothele macrura Banks, *nec* C.Koch, 1909, p. 155.

This species is reported by Franganillo from several localities. In the few specimens seen, the eyes of the anterior row are almost equidistant and are separated by less than a diameter of a.m.e. The a.m.e. are slightly smaller than a.l.e. but there is not the difference in size as figured by Franganillo.

Three other species in three other genera belonging to this subfamily, have been reported from Cuba. All three are described with the superior spinnerets very long and the inferior pair separated by at least four diameters. *Diplura macrura* (C. Koch) was described from a male from "St. Juan," one of the Virgin Islands. *Thalerothele striatipes* Simon (Hist Nat. Aran., 1, 1892, p. 187), reported by Franganillo, has been synonymized with *Thelechoris rutenbergi* Karsch of Madagascar (cf Simon, *ibid.*, 2, appendix, p. 968), where both genera are treated as synonyms of *Ischnothele*. However, it is scarcely probable that a spider from Madagascar would be found in Cuba. The specimon of *Ischnocolus hirsutus* (Ausserer), noted by Banks, is either a very young *Eurypelma* or a *Lasiodora*, according to Petrunkevitch. It is possible that all three reported species belong here.

Family BARYCHELIDAE

Sub-family LEPTOPELMATINAE

Genus Stothis Simon 1889

Stothis cubana Banks

Stothis cubana Banks, 1909, p. 155.

The type of this species is a female from Santiago de las Vegas and is in the Collection of the Museum of Comparative Zoology. Probably it has been dried, as it is too brittle to be handled and nothing more can be added to the description already given. Franganillo has found it in the Sierra Maestra.

Holotype ♀ Cuba; Santiago de las Vegas, (Baker), Banks Coll.

Family THERAPHOSIDAE

Sub-family GRAMMOSTOLINAE

Genus Eurypelma C. Koch 1850

Eurypelma spinicrus (Latreille)

Mygale spinicrus Latrielle, Dict. d'Hist. Nat., 2 ed., 1828, **22**, p. 118. (Cuba).
Mygale cubana Walckenaer, 1837, p. 213.
Xenestis (sic) *cubana* Franganillo, 1930, p. 8 of reprint (intended as a new species.)
Demotarbus cubanus Franganillo, 1931, p. 168 (new genus for his species.)
Xenesthis cubana Franganillo, 1936, p. 34 in text.
Xenestis (sic) *cubana* Franganillo, op. cit., footnote on p. 36.

The remarkable nomenclatural shuffles of Franganillo are difficult to follow. His "new species," *cubana*, was proposed, unaware of Walkenaer's earlier name. He considered that his new spider was not Latreille's *spinicrus*, and referred it at first to *Xenestris* Simon, 1891. Later he proposed a new genus *Demotarbus*. In his later publication of 1936, he quite improperly stated that *Eurypelma spinicrus* Latr. was a synonym of *Demotarbus cubanus*, and "should be suppressed," while of the combination *Xenestis cubana*, he wrote "from now on it ceases to exist." The footnote on page 36, however, states that his species *cubana* is a synonym of *spinicrus* (Latr.).

Genus Sphaerobothria Karsch 1879

Sphaerobothria gibbosus (Franganillo)

Cyrtopholis gibbosus Franganillo, 1935, p. 259, pl. 23, and figs. 1–5.

Female. Length, 30.0 mm., exclusive of mand., ceph. 14.0 mm., 11.5 mm. wide, abd. 16.0 mm.

Cephalothorax chestnut brown, moderately convex, truncate in front, covered with fine yellowish hairs, margins fringed with long hairs, thoracic groove a circular pit very near the posterior margin, completely filled with a cone 4.0 mm. high, with surrounding groove obliterated except on posterior margin; eye tubercle rather low, very near anterior margin, anterior row of eyes straight and eyes equidistant, a.m.e. separated by diameter, a.l.e. slightly larger than a.m.e., posterior row procurved, p.m.e. very small, a.l.e., p.l.e. and p.m.e. form a compact group; mandibles rather long, reddish-brown, thickly covered with fine hairs and long bristles; labium wider than long,

anterior margin covered with spinules; maxillae divergent, with scopula of reddish-yellow hairs on inner margin, apical angle in a conical projection, spinules anterior to the labium; sternum 7.0 mm. long, 6.0 mm. wide, truncate at anterior and posterior margins, IV coxae touching; abdomen shrunken and tip injured, dark brown, covered with long yellow hairs, spinnerets, apparently two pairs, superior pair four jointed; legs, 4–1–2–3, I pair, femur bent and flattened laterally, 10.0 mm. long, patella, 5.5 mm., tibia, 8.0 mm., metatarsus, 5.0 mm., anterior pairs with two narrow stripes of light hairs, separated by a wider dark stripe on patella, tibia and metatarsus, posterior pairs dull brown, covered with long yellowish hairs, anterior tarsi and metatarsi scopulate, posterior tarsi only scopulate, scopula not divided by row of setae, no spines on anterior pairs, unpaired spines beneath tibiae and metatarsi of III and IV; palpi colored like legs.

♀ Cuba; Trinidad Mountains, San Blas, September-December 1931, (G. C. Rowe), no. 10085

The genus *Sphaerobothria* was established for the species *hoffmanni*, tentatively identified by F. O. P. Cambridge from Costa Rica. He stressed the circular thoracic fovea with the conical tubercle. The primary character used by Simon in separating genera in this subfamily is the presence of a median row of setae in the scopula of the IV tarsus and this is supposed to be wanting in the genus *Sphaerobothria*. According to F. O. P. Cambridge, this is of little value, as it is easily overlooked and often does not develop until the last moult. Specimens of *S. hoffmanni* in the Museum of Comparative Zoology Collection show scattered setae throughout the scopula. The thoracic fovea is deep and entirely surrounds the conical tubercle.

The only specimen of *S. gibbosus* seen is a female, probably one moult from maturity, as it is about 5.0 mm. less than the dimensions given by Franganillo, lacks the sigilla on the sternum and has fewer spicules on the maxillae. It is much smaller than *S. hoffmanni*, the cone in the thoracic groove is higher and very near the posterior margin and the groove shows only as a trace on the posterior side.

Sub-family THERAPHOSINAE

Genus Phormictopus Pocock 1901

Phormictopus cubensis Chamberlin

Phormictopus cubensis Chamberlin, 1917, p. 59.

This species was described from two females, one probably collected near Havana by Felipe Poey. It may be the female of *P. caudus* (Ausserer), which is known only from the male.

Holotype ♀ Cuba; Havana, (Poey)

Paratype ♀ Cuba.

Phormictopus nesiotes Chamberlin

Phormictopus nesiotes Chamberlin, 1917, p. 60, pl. 4, figs. 8, 9.

Described from a male and two females collected in Cuba, 1864.

Sub-Order ARACHNOMORPHAE

Family FILISTATIDAE

Genus Filistata Latreille 1810

Filistata hibernalis Hentz

Filistata hibernalis Hentz, 1842, p. 227, pl. 8, fig. 6.
Filistata capitata Hentz, *ibid.*, p. 228, pl. 8, fig. 7.

This species is found in the southern part of the United States, Central America and the West Indies. It is common in all collections from Cuba. Petrunkevitch (1929) figures and describes both sexes, p. 56, figs. 36–40.

Genus Filistatoides F.O.P. Cambridge 1899

Filistatoides insignis (O.P. Cambr.)

Filistata insignis O.P. Cambridge, 1896, p. 211, pl. 26, fig. 12, pl. 28, fig. 8.
Filistatoides insignis, F.O.P. Cambridge, 1899, p. 47, pl. 3, fig. 10.

Female. Length, 4.5 mm., ceph. 2.0 mm., abd. 2.6 mm.

Cephalothorax bright brown, with a narrow marginal dark stripe and a diffuse median stripe from eye group to posterior margin, indented at thoracic groove, thoracic groove deep; eyes as in *Filistata hibernalis;* sternum longer than wide, slightly emarginate; abdomen pale yellow with a wide median stripe which in posterior half is broken by four to six chevrons connected in the center, venter pale; legs long and slender, same color as cephalothorax, with broken dark bands on femora, two on tibiae and metatarsi, no spines on anterior legs, calamistrum on basal half of fourth metatarsus; palpi large and covered with colorless hairs.

Male. Length, 4.0 mm., ceph. 2.0 mm., abd. 2.5 mm.

Coloring and markings same as on female but the bands on the legs less distinct; palpus very long and slender.

♂ ♀ Cuba; Santiago de las Vegas, 23 June, Banks Coll.

The species is based on a male and female from Guatemala. F.O.P. Cambridge described the genus *Filistatoides*, with this species as the type, because the sternum is longer than wide, the anterior legs are spineless and the anterior median eyes are equal to the posterior median eyes. It is smaller than *Filistata hibernalis*. Immature specimens were found at Soledad. Petrunkevitch did not find it in Puerto Rico.

Family DYSDERIDAE

Genus Ariadna Audouin 1825

Only two specimens of this genus have been seen. Franganillo reports *Ariadna bicolor* Hentz from Cuba but gives no definite locality. This species is found in the eastern part of the United States and has four pairs of long spines beneath the first tibia. Our immature specimens are from Soledad and Buenos Aires, 2,500–3,500 feet elevation, in the Trinidad Mountains. The first tibia has seven pairs of spines, overlapping and of equal length and seven pairs on the first metatarsus. Petrunkevitch reports *Ariadna arthuri* from Saint Thomas, Virgin Islands, also known only from an immature female. This species has seven pairs of spines on the first tibia that are alternately long and short. From St. Vincent, Simon reports *Ariadna solitaria*, with four pairs of spines beneath the first tibia as in *A. bicolor*.

Family OONOPIDAE

Sub-family OONOPINAE

Genus Oonopinus Simon 1892

Oonopinus minutissimus Petrunkevitch

Figure 1

Oonopinus minutissimus Petrunkevitch, 1929, p. 70, figs. 58–60.

Male. Length, 0.9 mm.

The male is marked the same as the female, possibly the pigmentation is not quite as deep. The palpus is remarkable; the femur is half as long as the cephalothorax, patella is almost round, tibia is greatly

enlarged, rounded on the exterior side and on the ventral extended in a large spur which is prolonged as a long stiff bristle; the tarsus is rather small with several long stiff hairs at the tip, the palpal organ is globose, scarcely covered by the cymbium, semi-transparent with a dark loop in the center. It is impossible to see any further structure.

Allotype ♂ Cuba; Soledad, Vilches Cave, 3 July 1931, (Bates and Fairchild)

Several males and females were collected by a Berlese trap from rubbish in Vilches Cave, near Soledad. Probably the amount of pigmentation varies, as the type collected from sifting dry leaves at Toa Alta, near San Juan, Puerto Rico has more color, but structurally the Cuban specimens agree with the type.

Genus Heteroonops Dalmas 1916

Heteroonops spinimanus (Simon)

Oonops spinimanus Simon, 1891, p. 563, pl. 42, fig. 6; Petrunkevitch, 1929, p. 67, figs. 53–57.

As Dalmas proposed the genus *Heteroonops* for this species in a footnote in 1916, p. 203, it has been overlooked. At that time the female only was known. Petrunkevitch found and described the male from Puerto Rico and figured the palpus.

♀ Cuba; Soledad, 1–11 August 1934, (Darlington)

Oonopoides gen. nov.

Cephalothorax oval, moderately high, thoracic portion sloping abruptly; sternum cordate; labium longer than wide; maxillae twice as long as labium, very slender with out-curved tips; first coxae elongate and posterior coxae globose, legs long, without spines but with inconspicuous hairs in rows on retrolateral side of anterior tibiae; abdomen without a shield, lacking hairs; eyes similar to *Oonops*.

Type *Oonopoides maxillaris* spec. nov.

The genus differs from others in the family by the long, out-curved maxillae. *Telchius* and *Hytanis* have elongate maxillae, but the former has spines on the legs and the latter a shield on the abdomen. It differs from *Oonops* by the lack of hairs on the abdomen, no spines on the legs, labium longer than wide, the long, out-curved maxillae and the long spinnerets. It differs from *Oonopinus* by the higher cephalothorax, maxillae and the very long spinnerets.

Oonopoides maxillaris spec. nov.

Figures 2, 3, 6

Male. Length, 2.0 mm., ceph. 0.8 mm., abd. 1.1 mm.

Cephalothorax pale yellow, oval, narrowing abruptly in front of first coxae, moderately high, cephalic portion level, thoracic sloping abruptly to posterior margin; eyes in a compact group, surrounded by black, a.l.e. largest of the six, separated by a diameter, posterior row slightly recurved and a little longer than first row, p.m.e. oval and touching, separated from p.l.e. by less than a radius, lateral eyes touching, clypeus low, less than a diameter of a.l.e.; mandibles vertical, long, narrowing abruptly at distal third to width of fang, fang long and slender; labium longer than wide; maxillae twice as long as labium, very slender, inclined inward, with the tips abruptly curved outward; sternum heart-shaped, widest between I coxae, IV coxae separated by a diameter; abdomen flesh-color, twice as long as wide, no shield, without hairs, except for a few at base, spinnerets almost as long as IV patella; legs long, 4–1–2–3, pale yellow, without spines, but inconspicuous hairs or bristles in rows on ventral side of I tibia, I coxa longest, trochanter half as long as tibia, posterior coxae almost globose; palpus very simple, tibia and patella about equal length and together about equal to length of femur, no spines on femur and two small bristles on tibia; palpal organ large; guide sickle-shape, embolus a slender dark spine from a slight swelling at tip of bulb.

Holotype ♂ Cuba; Soledad, August 1931, (Banks).

Paratypes 2♂ Cuba; Soledad, 8 July 1932, (Bates and Fairchild).

This species differs from the type of *Oonops* by the long and slender maxillae, hairless legs and abdomen, and the very long spinnerets. The eyes are similar but the head is slightly broader. It differs from *Heteroonops spinimanus* by the eyes, the lack of spines or bristles on the legs, the elongate maxillae, and in the palpus, by the nearly equal tibia and patella; also by the sickle-shaped guide at the end of the bulb.

Sub-family GAMASOMORPHINAE

Genus Ischnothyreus Simon 1893

Ischnothyreus peltifer (Simon)

Ischnaspis peltifer Simon, 1891, p. 562.
Ischnothyreus peltifer, Petrunkevitch, 1929, p. 66, figs. 51–52.

This species was originally described by Simon from St. Vincent. It has since been found in Sierra Leone, West Africa and the Philippines. Petrunkevitch reports it from Puerto Rico. A single female was found by C. F. Baker, 12 June at Havana. The male is not known.

Genus Opopaea Simon 1891

Opopaea darlingtoni spec. nov.

Figures 5, 7

Male. Length, 1.4 mm., ceph. 0.5 mm., abd. 0.8 mm.

Cephalothorax oval, nearly as wide as long, (3.4:4), anterior margin narrow and rounded, posterior margin excavate, rather low and flat, shining, no thoracic groove, roughly granular; eyes six, closely grouped, a.l.e. largest, separated by less than a radius, posterior row slightly recurved, p.m.e. oval, touching on long diameter, larger than p.l.e. and separated from them by a line; clypeus low, less than radius of a.l.e.; mandibles vertical, weak; labium fused to sternum, wider than long, tip much narrower than base; maxillae converging; sternum heart-shaped, longer than wide (2.5:2.0), lateral margins lobed, carried between IV coxae in a point, coxae rounded; abdomen oval, (4.0:5.5), dorsum flat, entirely covered by a shield, roughly granular, venter covered by a shield; legs, paler than cephalothorax, with no spines and few hairs; palpus, femur clavate, patella longer than femur, much swollen dorsally, tibia very small and narrow, tarsus almost as long as patella but not as much swollen, tip truncate.

Holotype ♂ Cuba; Maisi, 15–16 July 1936, (Darlington).

This species is much smaller than the genotype, *Opopaea deserticola* Simon, found in many parts of the world, and the palpus is even more swollen than is figured in that species. It is smaller than the *Opopaea lutzi* Petr., first reported from Puerto Rico, and since found at Soledad, and lacks the long curved embolus found in that species.

Opopaea lutzi Petrunkevitch

Opopaea lutzi Petrunkevitch, 1929, p. 61, figs. 42–50.

This species was described from an adult male and two immature specimens from Dorado, Puerto Rico, found by sifting leaves in a sea-grape thicket. Both males and females were taken at Soledad, from dead banana leaves in the garden, 8 August 1931, by L. G. Worley.

Petrunkevitch gives a detailed description and figures the various parts. It is probably congeneric with *Gamasomorpha floridana* Banks. The latter is known from females only, and is much smaller, the p.m.e. are oval, less than half as wide as long, and are touching on the long diameter. The p.m.e. of *Opopaea lutzi* are almost round.

Genus Triaeris Simon 1896

Triaeris patellaris spec. nov.

Figure 4

Female. Length, 1.7 mm.

Cephalothorax brownish-yellow, four-fifths as wide as long, smooth and shiny, with no hairs, narrowed at anterior margin, moderately high and sloping abruptly to posterior margin, no thoracic groove; eyes grouped in median half, posterior row recurved, p.m.e. largest of the six, round and touching, p.l.e. about half as large as p.m.e., a.l.e. and p.l.e. subequal, a.l.e. separated by more than a diameter and touching p.l.e. and p.m.e.; clypeus half the diameter of a.l.e.; mandibles cone-shaped and inclined slightly forward; labium triangular, base wider than long, tip narrow and deeply emarginate, suture distinct between sternum; maxillae broad and inclined over labium, twice as long as labium; sternum two-thirds as wide as long, strongly convex, with scattered, short hairs, extending between coxae, tip broadly truncate, IV coxae separated by more than a diameter; abdomen half as wide as long, convex, almost covered by a shield, four-fifths the entire length, sides grayish-white, entire abdomen covered by short hairs, most numerous at tip, venter whitish with short hairs; a basal shield surrounding the pedicel, seen from above as a dark line, ventrally extends to epigastric fold, a ventral shield from fold that is shorter than basal; openings of spiracles can not be seen, spinnerets short, surrounded by a chitinous ring; legs, femora enlarged, patellae elongate, I patella almost as long as tibia, 2–2 long ventral spines, I tibia with paired spines, II patella not as long as tibia; epigynum a straight slit.

Holotype ♀ Cuba; Soledad, 1–11 August 1934, (Darlington).

Paratypes 2♀ Cuba; Soledad, 1–11 August 1934, (Darlington).

This species is a little smaller than the genotype; it has less color and the dorsal shield is longer. Simon describes *Triaeris stenaspis* with a shield that reaches only a little beyond the middle and with a shining abdomen; also he does not mention the hairs.

Sub-family TETRABLEMMINAE

Genus Tetrablemma O. P. Cambridge 1873

Tetrablemma cambridgei spec. nov.

Figures 8–10, 13

Male. Length, 0.8 mm., ceph. 0.4 mm., abd. 0.5 mm.

Cephalothorax bright orange brown, darker about margin, cephalic portion very high, extending on the same level for more than two-thirds the length of the carapace, ending abruptly and sloping to the posterior margin, no thoracic groove or lateral striae; eyes, four, in a compact group about one-third nearer the anterior margin than the end of cephalic area, anterior eyes largest, oval and almost touching, surrounded by black, second row longer, eyes about half as large as anterior and touching eyes of first row; clypeus sloping outward and equal to one-third the cephalic area; mandibles large, rounded and slightly porrect, fang very short; labium small, at least twice as broad as long, with tip broadly truncate, sternum convex, very broad between I coxae, IV coxae separated by more than two diameters; abdomen reddish-brown, oval, almost as high as long, shield covering the entire dorsum, granulate, with scattered hairs, venter covered with chitinous plates, the largest surrounding the pedicel and covering about two-thirds of the venter; near the base are two clear ovals probably representing the lung sacs; the large plate is followed by a very narrow and shorter plate, and there are two larger plates that extend to the apex and include the spinnerets, the sides have three narrow corneous folds, broken opposite the last ventral plate; between the largest ventral plate and the lateral ridges are rudimentary chitinous dots; legs a shade paler than cephalothorax, rather short, without spines but a few slender hairs in rows, three claws on onychium with three teeth, no tarsal comb, all coxae globose, I pair largest; palpus large, femur plus patella and tibia not as long as cephalothorax, tibia much swollen, more than twice as large as patella; tarsus reduced to a very small piece that does not cover the palpal organ; palpal organ very simple and very similar to the figure of *Tetrablemma medioculatum* Cambridge, the type of the genus.

Female. Length, 1.0 mm.

The color and the shields the same as in the male; the epigynum a pair of simple openings separated by a narrow septum near the posterior margin of the basal plate.

Holotype ♂ Cuba; Soledad, 8 July, 1932. (Bates and Fairchild)
Allotype ♀ Cuba; Soledad, 8 July, 1932. (Bates and Fairchild)
Paratypes 4♂ Cuba; Soledad, 8 July, 1932. (Bates and Fairchild)

The type of the genus, a unique male, is from Ceylon, and was described and figured by O. P. Cambridge in 1873. He considered it so aberrant that he created a new family for it,—Tetrablemmidae,—and suggested that it was related to the Oecobiidae and Dysderidae. Later Simon borrowed the type, and in the Histoire Naturelle des Araignées, 1894, **1**, p. 573 placed it, probably because it has three claws, in the Theridiidae with *Paculla*, six-eyed spiders from Ceylon, Sumatra, and the Philippines. Petrunkevitch in the Systema Aranearum, 1928, places it among the Oonopidae.

Dr. C. R. Crosby (1934, pp. 19–23) described a similar spider from Vicosa, Minas Geraes, Brazil, that has the same arrangement of plates but has only two eyes. He believed that it was not a member of the Oonopidae because of an unpaired tarsal claw, and on the paired claws, a single, instead of a double series of teeth. In other respects it resembles that family.

At present there are four genera that have many characters in common. The genus *Tetrablemma* now contains three species, the genotype *medioculatum* O. P. Cambridge, from Ceylon, *T. okei* Butler, from Victoria, Australia, (Proc. Roy. Soc. Victoria, n. s., **44**, 1932, p. 111) and *T. cambridgei* from Cuba. The other genera have one species each, *Diblemma donisthorpii* Cambridge, (Proc. Dorset Nat. Hist. Club, **29**, 1908, p. 188, pl. A, fig. 7) from specimens found in a hot-house in Kew Gardens; *Hexablemma cataphractum* Berland, from East Africa, (Res. Sci. Voy. Allnand and Jennel, Afric. Orient; Arachn, **4**, 1920, p. 167), and *Matta hambletoni* Crosby, from Brazil.

The Cuban species differs, however, from the type of the genus by the position of the eyes. In *Tetrablemma medioculatum*, the eyes form a more compact group "on a circular eminence in the centre of the cephalothorax," and between the eye group and the anterior margin, the cephalothorax is prolonged in a horn, or spur. In *T. cambridgei* the eye area is about one-third distant from the anterior margin; the eyes of the second row are more widely separated and the horn, or spur, is missing so that the clypeus slopes directly from the eyes to the margin. The Ceylon specimen has a long tooth, or spur, near the base of the mandible which projects backward; this, too, is wanting in the Cuban species. The two species are alike in size, color, number and position of the plates, number of eyes, and the extremely simple palpus.

Family CAPONIIDAE

Genus Nops MacLeay 1839

Nops guanabacoae MacLeay

Figures 12, 16

Nops guanabacoae MacLeay, 1839, p. 3, pl. 1, fig. 1.
Nops olivaceus Franganillo, 1931, p. 287.

Male. Length, 6.2 mm., ceph. 2.8 mm. long, 2.0 mm. wide, abd. 3.2 mm.

Cephalothorax chestnut brown, oval, widest between II pair of legs, narrowed in front of the eyes, no dorsal groove and radial striae very faint; two eyes, almost round, separated by less than a diameter and surrounded by black; clypeus more than three times diameter of eye, sloping gently forward and then very abruptly; mandibles small, vertical and attenuate, fang rather wide at base, suddenly becoming slender and bent; labium twice as long as wide, suture between labium and sternum very faint, excavate at basal third, attenuate to a very narrow tip; maxillae curving around labium and tips almost meeting; sternum brown, flat, oval, and a third longer than wide, narrowed to width of labium anteriorly, truncate between IV coxae, deeply emarginate by II and III coxae; abdomen slender, a dull olive-gray, showing indistinctly a few lighter colored chevrons near tip, venter yellowish-gray; legs, 1–4–2–3, little paler than cephalothorax, I coxae about one-half as long as femur with a large lobe just above the sternum, II coxae not quite as long and lobe smaller, anterior trochanters globose, posterior elongate, all legs lacking spines and with very few hairs, tarsi with false suture dividing joint in two segments of which distal is shorter, anterior tarsi with two claws, posterior with three claws, anterior tarsi with a pair of white transparent lobes at base and metatarsi with a membranous lamina on ventral side; palpus, femur with a small stridulating spur at base, palpal organ very simple, protruding from terminal joint which is not enlarged, sides parallel, ventral portion beyond organ partly covered with stiff, coarse bristles.

Allotype ♂ Cuba; Isle of Pines, 1918, (Barbour and Brooks)

♀ Cuba; San Antonio de los Baños, 21 March, 1915, (Barbour and Brooks)

♀ juv. Cuba; Soledad, quarry, August 1931, (Banks and Worley)

♀ Cuba; Jiguaní, Los Negros, February 1913, (Barbour)

In 1936, Franganillo recognized his *Nops olivaceus* as a synonym of *Nops guanabacoae.*

Genus Caponina Simon 1891

Caponina pelegrina spec. nov.

Nops guanabacoae Banks, *nec* MacLeay, 1909, p. 156.

Female. Length, 10.0 mm., ceph. 4.0 mm. long, 2.5 mm. wide, abd. 6.0 mm.

Cephalothorax bright yellow brown, with a small black spot between the eyes, slightly narrower at anterior than at posterior margin, much narrower in front of eyes, no thoracic groove; two eyes, broad oval, separated by short diameter; clypeus at least three times diameter of eye with a few short, stiff, black bristles near margin, slopes very gently to margin; mandibles covered with stiff black hairs, small, vertical and attenuate, fang very short; labium little longer than broad, attenuate, only slightly excavate at base, fused to sternum; maxillae only little longer than labium, basal half broad, distal half abruptly bent so that tips almost meet, palpi inserted above middle; sternum eliptical, half as wide as long, widest between II coxae, pointed between IV coxae, margins hairy and extended between coxae, IV coxae separated by a diameter; abdomen a dull olive-brown, thickly covered with fine hairs, venter dull yellow; legs, 4–1–2–3, same color as cephalothorax, covered with fine hairs, all coxae covered with hairs, I coxae longest with a large lobe on margin above the sternum, trochanters short and hairy, IV trochanter no longer than I trochanter, no false articulations on tarsi; palpi long, small stridulating spine on inner side of femur, two terminal joints thickly covered with short, stiff hairs; epigynum a straight slit between openings of anterior spircles.

Holotype ♀ Cuba; Santiago de los Vegas, Banks Coll.

This specimen was identified by Mr. Banks in his Arachnida of Cuba as *Nops guanabacoae* MacLeay. It is, however, not a true *Nops*, as it lacks the membranous appendage at the base of the anterior tarsi, the thin membranous lamina extending the entire length of the anterior metatarsi, and the posterior trochanters are not elongated. It agrees perfectly with specimens of *Caponina sargi* Cambridge from Guatemala, even to the position of the small stridulating spine on the femur of the palpus, but until males are found from each locality, the two can be considered distinct species. MacLeay, in his description of *Nops guanabacoae*, calls attention to another species, which is probably this one.

The two species of *Caponiidae* found in Cuba are easily separated. *Nops guanabacoae* is the smaller, more brightly colored and almost

hairless, the legs are smooth and the few hairs on the ventral side are inconspicuous. *Caponina pelegrina* is the larger and dull colored, the legs and abdomen are covered with hairs and the distal half of the maxillae are more attenuate.

Family OECOBIIDAE

Genus Oecobius Lucas 1845

Oecobius benneri Petrunkevich

Oecobius benneri Petrunkevitch, 1928, p. 75, figs. 64–65.

Petrunkevitch states that this is a common species in the West Indies. He found it to be quite numerous on the walls of the University building at Rio Piedas in Puerto Rico, and in collections from St. Thomas and Guadeloupe. It is known only from the female. One was found in a banana leaf from the garden at Soledad, 12 August, 1931, by Dr. L. G. Worley. It differs from the figures of the type by the shorter posterior spinnerets and the larger p.l.e.

♀ Cuba; Soledad, on a banana leaf in garden, 12 August, 1931, (Worley).

Family AGELENIDAE

Genus Chorizomma Simon 1872

Chorizomma antillanum spec. nov.

Figure 14

Male. Length, 2.5 mm., ceph. 1.4 mm., abd. 1.4 mm.

Cephalothorax dull yellow, two-thirds as wide as long, narrowed in front of I coxae, thoracic groove rather long, and on posterior half of carapace; six eyes, nocturnal, eyes of anterior row largest, separated by less than a diameter, posterior row slightly procurved, eyes subequal, p.m.e. separated by a little more than a diameter and from p.l.e. by about half a diameter; (the spider has recently moulted and the cast of the eye area is pushed back so that six pairs of eyes can be seen); clypeus low, about half a diameter of anterior eye; mandibles vertical, fang groove oblique, inferior margin with a row of minute teeth, superior margin with four, possibly more small teeth about opposite those on inferior margin, fang rather short; labium as long as wide, basal third excavate on margin; maxillae twice as long as labium, with parallel sides, upper exterior margin with a dark carina;

sternum as wide as long, widest between II and III coxae, prolonged in a lobe between IV coxae; abdomen much shrunken, grayish-yellow, without any definite markings but darker at the tip, venter dull yellow; spinnerets, superior spinnerets two jointed, terminal joint about one-half the length of basal; legs broken, colorless, femora without spines, I tibia, ventral, 2–2 spines, metatarsus, ventral, 2–2–2, spines numerous on posterior tibiae and metatarsi but not paired; palpus, no enlargement on femur and patella as in *Chorizomma californicum* Simon, one long spine at tip of patella, tibia shorter than patella with an external and ventral apophysis as figured, palpal organ about as broad as long, bulb bilobed at apex and a bifid process which rests against the ventral apophysis of tibia, embolus arising near the upper part, curving and ending near the bifid tip of the bulb.

Holotype ♂ Cuba; Soledad, 14 July, 1935, (Weber)

This species is smaller than *Chorizomma subterraneum* or *C. californicum*. It differs from the latter in the palpus, and from the former by the relative size of the eyes. The genotype is found in caves of the Pyrenees and southern France. A closely related species is found in Lower California, Mexico, and a third is found in California.

Family HERSILIIDAE

Genus Tama Simon 1882

Tama habanensis Franganillo

Figures 11, 17

Tama habanensis Franganillo, 1935, p. —, fig. 35; 1936, p. 39, fig. 17.

Female. Length, 4.2 mm., ceph. 1.6 mm., abd. 2.6 mm.

Cephalothorax very broad, quite flat, pale brown lightly veined with black, a wide marginal stripe of black, thoracic groove long; eye area not raised in a tubercle as in *Tama mexicana* (O. P. Cambridge); anterior row of eyes very strongly recurved, so that anterior margin of a.l.e. and posterior margin of p.m.e. form a straight line, a.m.e. slightly smaller than p.m.e. and separated by more than a diameter, a.l.e. very small, flat, colorless and hardly noticeable in a dorsal view, and together with the p.l.e. on a low tubercle, posterior row recurved, eyes subequal, p.l.e. directed slightly backward, p.m.e. separated by almost two diameters; quadrangle of median eyes higher than wide and only slightly narrower in front; clypeus vertical and about as high as diameter of a.m.e.; mandibles small, fang short and weak; labium

wider than long; maxillae not twice as long as labium and slightly inclined, sides almost parallel and tip truncate; sternum pale, as wide as long, IV coxae separated by a diameter; abdomen pentagonal, pale brown, lightly veined with black and a basal spear-mark which extends over more than half the abdomen, tip prolonged in a cone to the length of the inferior spinnerets, venter pale, terminal joint of spinnerets longer than abdomen; legs, 2–1–4–3, III pair much shorter than others, no indications of false articulation on metatarsi, femora with indistinct black bands on upper side, patellae dark, wide dark bands at middle and tip of tibiae, spines scattered, weak, not paired; epigynum two oval openings, oblique and almost touching.

♀ Cuba; Soledad, Mina Carlota, 1 December 1927, (Creighton)

Family PALPIMANIDAE

Genus Otiothops MacLeay 1839

Otiothops walckenaeri MacLeay

Figure 15

Otiothops walckenaeri MacLeay, 1839, p. 12, pl. 2, fig. 5.

Female. Length, 5.0 mm., ceph. 2.3 mm., abd. 2.5 mm.

Cephalothorax a deep reddish-brown, much roughened, oval, more than half as wide as long, front rounded, cephalic portion very high and occupying three-quarters of the carapace, thoracic portions slope abruptly to posterior margin, thoracic groove wanting and represented by a deep triangular depression on the thoracic slope; eyes, anterior row straight, equidistant, a.m.e. round, largest of the eight, separated by a radius, a.l.e. about half the diameter of a.m.e., posterior row slightly longer than anterior, procurved, p.m.e. white, flat and oval, separated by a line, (less than half a radius), p.l.e. separated from p.m.e. by more than diameter of p.m.e., lateral eyes subequal and touching; quadrangle of median eyes as wide in front as behind and much higher than wide; clypeus convex and higher than quadrangle; mandibles cone-shaped and vertical, fang groove concealed; labium triangular, slightly longer than wide; maxillae longer than labium, inclined so that tips almost meet, outer margins rounded, palpi inserted above the middle; sternum reddish-brown, convex, granular, carried between coxae, broadly truncate between IV coxae which are separated by more than a diameter; abdomen oval, dark brown, thickly covered with short, stiff hairs, venter dark brown

covered with hairs, a basal shield includes the epigynum; legs without spines, I pair much enlarged, dark brown, coxae twice as long as wide, trochanter rather short, femur enlarged, flattened laterally, patella as long as tibia, much narrowed at base, tibia with short flattened prolateral hairs, tarsus shorter than tibia with a prolateral thick brush of hairs on basal half II, III and IV pairs pale yellow, II patella shorter than tibia, metatarsus with light brush of hairs; palpus, patella small, as long as wide, tibia much swollen, terminal joint with long, stiff hairs on retrolateral side; spinnerets small, surrounded by a narrow chitinous collar; epigynum is a curved slit at the posterior margin of the basal shield that extends from the pedicel to fold, posterior to the epigynum is a narrow chitinous crescent.

Male. Length, 4.6 mm., ceph. 2.0 mm., abd. 2.5 mm.

The male is like the female but a little smaller; I tibia has a thin brush of iridescent hairs on the prolateral side that is lacking in the female; palpus rather short, pale yellow, tibia little longer than patella, much swollen so that it is wider than long, terminal joint covered with stiff black hairs, palpal organ a simple round bulb, and embolus a straight tube from near the middle.

Allotype ♂ Cuba; Soledad, 1–11 August, 1934, (Darlington)
♀ Cuba; Soledad, 1–11 August, 1934, (Darlington)
♀ Cuba; Soledad, 12 August, 1931, (Worley)
♀ Cuba; Soledad, February, 1925, (Salt)

This species was described from a female found near Havana by MacLeay. Since then, Simon has described a female of about the same size from St. Vincent and Petrunkevitch, a female much smaller from Puerto Rico. Apparently the specific difference is in the quadrangle of the median eyes.

Family PISAURIDAE

Genus Pelopatis Bishop 1924

Pelopatis undulata (Keyserling)

Tetragonopthalma undulata Keyserling, 1887, p. 486, pl. 6, fig. 42. (♀; S. Florida; Marx Coll.)
Thanatidius dubius, Banks, *nec* Hentz, 1909, p. 166.
Pelopatis undulata, Bishop, 1924, p. 21, pl. 3, fig. 1, pl. 4, figs. 2–5.

In 1924, Bishop separated the genus *Pelopatis* from *Thanatidius* on the basis of the position of the a.l.e. and the number of spines on the anterior tibiae and metatarsi. All the Cuban specimens seen are immature.

♀ Cuba; Havana
♀ Cuba; Soledad, 7 August, 1931, (Worley)
♀ Cuba; Soledad, 8 June, 1925, (Salt)
♀ Cuba; Soledad, 1–11 August, 1934, (Darlington)

Genus Thaumasia Perty 1833

Thaumasia connexa spec. nov.

Figure 22

Female. Length, 8.0 mm., ceph. 4.0 mm., abd. 4.8 mm.

Cephalothorax pale, scantily covered with short brown hairs, as wide as long, anterior margin truncate, thoracic groove short and very near posterior margin; eyes cover two-thirds width of head, anterior row recurved, equidistant, a.m.e. larger than a.l.e. and separated by less than a diameter, posterior row longer than anterior, strongly recurved, so that anterior margins of p.m.e. and posterior margins of p.l.e. form a straight line, eyes subequal, p.m.e. separated by about a diameter, p.l.e. on tubercles and directed backwards; quadrangle of median eyes much narrower in front, and by the outer margins, wider than high; clypeus inclined forward and equals a diameter and a half of a.m.e.; mandibles pale, covered with long white hairs and black bristles, fang groove oblique, superior margin with one large tooth and scopula of long hairs, inferior margin with three teeth, two near base of fang, subequal and larger than third tooth, fang evenly curved; labium longer than wide, sides about parallel, basal half of lateral margins only slightly excavate; maxillae parallel, one and a half times longer than labium; sternum pale, as wide as long, ending in a slender point between IV coxae; abdomen oval, two-thirds as wide as long, pale, dorsum clouded with dark gray, venter pale; legs, left II and IV missing, 4–3–1–2, same color as cephalothorax with irregular, wide band on all joints, all trochanters notched, spines, I pair, patella, 1 dorsal, at tip, tibia, 1 dorsal, subapical, 2–2–2, lateral, 2–2–2–2, ventral, distal pair short, others more than twice the diameter of the joint, metatarsus, one half the length of tibia, spines, dorsal 0, lateral 2–2, ventral 2–2; epigynum wider than long, a broad median tongue not reaching the fold with strongly convexed lobes each side thickly covered with short, white hairs as figured.

Holotype ♀ Cuba; Pico Turquino, 1,500 feet, 25 June, 1935, (Darlington)

Thaumasia marginella (C. Koch) has been reported from Cuba and

several other islands of the West Indies. Petrunkevitch figures the palpus and epigynum in his "Spiders of Porto Rico," and states that specimens from Jamaica are much smaller than those from Brazil. The specimens in the collection are much larger than *Thaumasia connexa* and have a very different epigynum. *Thaumasis pinicola* (Hentz) is known only from one immature female from Punta Gorda, Forida. This immature specimen is about the same size as *T. connexa* and has the same arrangement of eyes and spines, but the legs are much shorter. The Florida specimen is probably about half grown, as it shows no trace of the epigynum.

Thaumasia marginella (C. Koch)

Dolomedes marginella C. Koch, 1848, **14**, p. 120, pl. 486, fig. 1355.

An immature specimen from Havana may be this species. Petrunkevitch in his "Spiders of Porto Rico," 1929, p. 84, states that it is a widely distributed Neotropical species and it has been reported from many of the islands of the West Indies.

Family LYCOSIDAE

Sub-family LYCOSINAE

Genus Lycosa Latreille 1804

Three species of *Lycosa* have been described from Cuba by early writers. Lucas in 1857, described *Lycosa insularis*, a female 11.0 mm. long, from near Havana. The figure shows two dark stripes on the cephalothorax with a median pale stripe and marginal ones of about the same width.

In 1877, Keyserling described two species simply from the locality—"Mittleamerica, Cuba." It is not improbable that *Tarentula badia* is the male of *Tarentula fusca* and they may prove to be *Lycosa insularis*. However, detailed descriptions are given as well as figures of the palpus and epigynum.

In 1930, Franganillo described two more very briefly, without figures of the palpus or epigynum, so it is impossible to recognize them.

One hesitates to add another name to this already confused genus, but unfortunately, a pair from Havana do not agree with any description or figure. *Lycosa isolata* has a narrow median pale stripe starting at the anterior eye row, but it is much larger than *Lycosa atlantica* and the palpus and epigynum are distinct.

Lycosa atlantica was described by Marx from a female from Bermuda. It is easily identified, as the median pale stripe is very narrow and extends between the a.m.e. as in *Lycosa helluo* Walck., to which it is, undoubtedly, closely related. The venter is pale gray, the male palpus is very long and slender and the fang has a distinct tooth on the outer side about the middle. This tooth is very small in the female.

Lycosa atlantica Marx

Figure 18

Lycosa atlantica Marx, 1889, p. 100, fig. 4. (♀; Bermuda)

Male. Length, 7.2 mm., ceph. 4.0 mm., abd. 3.6 mm.

Cephalothorax pale brown with a narrow median pale stripe from the anterior eye row to posterior margin, a submarginal pale stripe wider than the median stripe; eyes, anterior row straight, slightly shorter than second row, equidistant, a.m.e. larger than a.l.e., eyes of second row separated by less than a diameter, and by more than a diameter from p.l.e.; clypeus equal to diameter of a.m.e.; mandibles long, with black bristles, superior margin of fang groove with two teeth and an irregular scopula, inferior margin with three teeth, fang short with a well developed tooth on outer side about the middle; labium as wide as long, deeply excavate at basal third, with a row of stiff dark bristles on front margin; maxillae more than twice as long as labium, sides parallel; sternum oval, two-thirds as wide as long, with short black hairs, IV coxae almost touching; abdomen with a median basal spear-mark about half the length of the abdomen, sides pale, venter pale with a faint darker U-shaped mark; legs, 4–1–2–3, all trochanters deeply notched, pale yellow, somewhat darker at tips, dorsal sides covered with fine dark hairs, spines long, black and conspicuous, I pair, tibia, ventral 2–2–2–2, lateral 2, metatarsus, ventral 2–2–2, lateral 3; palpus, long and slender, femur with a thick retrolateral brush of dark hairs, tibia plus patella longer than femur, tibia very long, terminal joint shorter than tibia and not much longer than patella, palpal organ as figured.

Allotype ♂ Cuba; Havana, August 1931, (Banks)

♂ ♀ Cuba; Havana

Originally described from Bermuda, this species has since been found by Petrunkevitch in Puerto Rico. He had, however, only a female. It is well represented in the Museum of Comparative Zoology collection by males and females from Bermuda and by three specimens from Cuba.

Lycosa fusca (Keyserling)

Figures 23, 24

Tarentula fusca Keyserling, 1876, p. 640, pl. 7, fig. 22.
Lycosa fusca, Petrunkevitch, 1929, p. 91, figs. 76–79.

Female. Length, 13.0 mm., ceph. 7.0 mm., abd. 6.5 mm.

Cephalothorax with a median pale stripe which does not pass anterior to p.m.e. and which gradually widens from p.l.e. to thoracic groove where it narrows, so that at posterior margin it is about half as wide as between p.l.e., a pair of small dark spots in stripe about opposite II coxae, marginal pale stripe covered with white hairs with an irregular upper margin, black about the eyes and eye area covered with a dense mass of white hairs; eyes, anterior row slightly shorter than second row, equidistant, a.m.e. larger than a.l.e., eyes of second row separated by less than a diameter and from p.l.e. by more than a diameter, p.l.e. about half as large as p.m.e.; clypeus equal to radius of a.m.e.; mandibles black with short black bristles and short white hairs, superior margin of fang groove with three teeth, the middle the largest, inferior margin with three subequal teeth; labium little longer than wide, slightly excavate on sides at base, tip truncate; maxillae twice as long as labium; sternum and coxae black, sternum slightly longer than wide, IV coxae almost touching; abdomen with an indistinct basal spear-mark, with usual narrow pale stripe each side very indistinct at base, venter almost covered with a dark spot that is about as wide as long; legs pale brown without marks, anterior tibiae, metatarsi and tarsi a little darker, legs covered with many dark hairs and bristles and a few white scales, dense scopula on anterior tarsi, metatarsi and distal half of tibiae; palpi, terminal joint almost black; epigynum wider than long, median septum very short and terminal cross piece very long and broad, a circular depression each side of median septum and a smaller dark circle beyond beneath the skin.

Male. Length, 9.5 mm., ceph. 6.0 mm., abd. 4.5 mm.

Cephalothorax with median pale stripe the width of p.l.e. narrowing to about half width at posterior margin, a pair of small black dots in stripe opposite II coxae, pale lateral stripes with irregular upper margins, dark stripes veined with black, black about eyes with crest of white hairs between p.m.e. and p.l.e.; eyes, anterior row about the same length as second row, equidistant, procurved by upper margins, a.m.e. larger than a.l.e., eyes of second row separated by diameter; clypeus about half the diameter of a.m.e.; mandibles almost black

with scattered long bristles and white hairs, superior margin of fang groove with three teeth, middle largest, inferior margin with three subequal teeth, fang simple; labium slightly wider than long, margins of basal third excavate; maxillae more than twice as long as labium; sternum dark brown, oval, little longer than wide, IV coxae almost touching; abdomen with usual spear-mark rather indistinct, bordered with pale lateral stripes covered with white hairs which meet and extend to spinnerets, venter black from epigastric fold to spinnerets, sides pale with many dark spots; legs, I pair missing, all coxae dark brown, II pair pale brown with last two joints darker, posterior legs pale; palpus pale, seen from above tibia little longer than patella, from beneath, tibia twice the length of patella, terminal joint little longer than tibia, palpal organ with the characteristic parts, the dark tip below the end of the embolus has a sharp point which extends on the cymbium, but it is much smaller and not triangular as Petrunkevitch figures, (fig. 76). The under side of the cymbium beyond the palpal organ is covered with short hairs, not long and recurved as in *Lycosa isolata*.

♂ ♀ Cuba; Soledad, February, 1925, (Salt)
♂ ♀ Cuba; Soledad, July, August, 1931, (Worley)
♀ Cuba; Isle of Pines, La Ceiba, 1918, (Barbour and Brooks)
♀ Cuba; Matanzas, 1931
♀ Cuba; Jovellanos

Keyserling described this species from a female from the indefinite locality,—"Mittelamerika, Cuba." As usual, he was most explicit about color and markings. At the same time, he described a male under the name *Tarentula badia* from the same indefinite locality. The only difference between the two, is the black venter in the male. Among the specimens from Cuba there is great variation in size and markings. In some, the venter is black from pedicel to spinnerets; again it is pale, or thickly covered with dark spots; in a few, the median line of white hairs is carried between the a.m.e., but none have been seen with the line continued to the margin of the clypeus. It is not improbable that *T. badia* is the pale male of *T. fusca* and in that case, the name *badia* has priority.

Petrunkevitch, in his "Spiders of Porto Rico," figures the epigynum of three females. All are very unlike Keyserling's figure or the Cuban specimens, so that it is not improbable that another species is found in Puerto Rico.

Lycosa isolata spec. nov.

Figures 19, 26

Male. Length, 14.0 mm., ceph. 8.0 mm., abd. 6.8 mm.

Cephalothorax with a narrow median pale line from the anterior eye row to posterior margin, with margins almost parallel posterior to p.l.e., a mass of white hairs between eyes of second row, sub-marginal pale stripe with irregular margins, wider than median stripe, eyes of second and third rows surrounded by black; eyes, anterior row a little longer than second row, slightly procurved by the upper margins, equidistant, a.m.e. slightly larger than a.l.e., eyes of second row separated by more than a diameter; clypeus as wide as diameter of a.m.e.; mandibles covered with short white hairs but no long bristles, superior margin of fang groove with two small teeth, inferior margin with three subequal, equidistant teeth, fang simple, without tooth on exterior side; labium pale, almost square; maxillae more than twice the length of labium; sternum pale yellow, oval, two-thirds as wide as long, IV coxae almost touching; abdomen dark brown, thickly covered with hairs, a basal spear mark extending to middle, a pale stripe each side of about half the width which disappears about the middle, venter entirely black from pedicel to spinnerets; legs pale yellow, dorsal side of femora covered with short dark hairs so that joint appears darker, scopula on anterior tarsi and distal half of metatarsi, spines, I pair, tibia, ventral, 2–2–2, lateral, 2, metatarsus, ventral, 2–2, lateral, 1; palpus seen from dorsal side, tibia but little longer than patella and terminal joint about one and a half times length of tibia, seen from ventral side; tibia twice as long as patella, ventral side of tarsus beyond palpal organ thickly covered with long hairs with a recurved tip, palpal organ as figured.

Female. Length, 10.0 mm., ceph. 6.0 mm., abd. 5.5. mm.

Cephalothorax bright brown with a faint narrow median pale stripe from anterior eye row, widening at thoracic groove and continuing to posterior margin, a narrow sub-marginal stripe covered with white hairs, black about the eyes; eyes, equidistant, anterior row straight, a.m.e. larger than a.l.e.; eyes of second row separated by about a diameter and from p.l.e. by a diameter and a half; clypeus equal to a little more than a radius of a.m.e.; mandibles dark red brown, covered with bristles and white hairs, superior margin of fang groove with two teeth, inferior margin with three sub-equal teeth, fang short and stout; labium slightly longer than wide, deeply excavate at base and truncate at tip; maxillae parallel; sternum two thirds as wide as long, pointed at tip, IV coxae almost touching; abdomen brown with a darker brown basal

spear mark outlined at base and sides with a pale line, venter pale; legs much broken, brown without any indications of darker rings, scopula on anterior tarsi, metatarsi and distal half of tibiae, spines, I pair, tibia, ventral, 2–2–2, lateral, 1, all shorter than diameter of joint; metatarsus, ventral, 2–2–2, lateral, O, all very short; epigynum longer than wide, with a long median septum, slightly notched above the middle, cross piece shorter than septum.

Holotype ♂ Cuba; Havana, (Baker)

Allotype ♀ Cuba; Havana, (Baker)

The female has been rubbed, so that the median pale stripe appears wider than in the male, the abdomen is shrunken and the venter pale, not a deep black as in the male. The epigynum is very similar to the figure of *Lycosa dilatata* Cambr. from Costa Rica and Panama, which has been reported by Franganillo from the Sierra Maestra, Cuba. This species is much smaller and lacks the marks on the venter. The figure no. 77 which Petrunkevitch gives for *Lycosa fusca*, 1929, p. 92, is very similar to the Cuban species but it lacks the process on the median septum, and the superior margin of the fang groove has three teeth.

Lycosa isolata can be separated from *L. fusca* by the median pale stripe, which is very narrow in *isolata* and about as wide as the space between p.l.e. in *fusca*, and by the palpus of the male and the epigynum of the female.

Lycosa riparia Hentz

Lycosa riparia Hentz, 1844, p. 389, pl. 17, figs. 13–15; Chamberlin, 1908, p. 234, pl. 17, figs. 5, 6.

A common spider in the southern part of the United States. A male was found at Soledad, 15 June, 1925 by Salt that was much paler than the typical form and lacks the usual four narrow lines on the venter, but the palpus is the same. The shape of the barb-like spur on the palpal organ is characteristic. An immature female was found at Soledad during February, 1925. Franganillo has not reported it.

Genus Arctosa C. Koch 1848

Arctosa littoralis (Hentz)

Lycosa littoralis Hentz, 1844, p. 388, pl. 17, fig. 9.
Lycosa cinerea, Chamberlin, 1908, p. 281, pl. 12, figs. 5, 6; nec *cinerea* (Fabr.).
Arctosa littoralis, Gertsch, 1934, p. 7.

Both Banks and Franganillo have reported *Arctosa cinerea* from El Guamá, Cuba. In recent years it has been proved that the European species is not found in America, and the Cuban species is probably *Arctosa littoralis*, which is common in the southern part of the United States.

Sub-family PARDOSINAE

Genus Pardosa C. Koch 1848

Pardosa albopilosa Franganillo

Figures 20, 21, 28

Pardosa albopilosa Frang., 1931, p. 286; 1936, p. 42.

Male. Length, 4.2 mm., ceph. 2.5 mm., abd. 2.0 mm.

Cephalothorax black about eyes, median yellow stripe very vague anterior to the thoracic groove, sides deep brown shading to black, sub-marginal stripe yellow, obscure anterior to I coxae; eyes, anterior row shorter than second row, a.m.e. separated by more than a diameter and a half and from a.l.e. by less than a diameter, larger than a.l.e.; eyes of second row fully two diameters apart; clypeus high, equals nearly two diameters of p.m.e., a narrow yellow line below anterior row of eyes; mandibles black with tips pale yellow; labium wider than long; maxillae slightly converging; sternum dark brown, almost black, IV coxae touching; abdomen dark, almost black with usual basal spear mark very obscure, sides mottled, venter dark gray; legs, coxae almost black, femora dark gray at base, gradually fading so that tips of tibiae, metatarsi and tarsi are yellow, no indications of darker rings, very scant scopula on anterior tarsi, spines, I pair, tibia, ventral, 2–2–2, basal and median very long; palpus dark gray, patella and tibia almost black, terminal joint yellow at tip, seen from above, tibia about twice as long as patella, palpal organ very similar to *Pardosa milvina* (Hentz) but scopus not large, cone-shaped and not covered, lateral tenaculum dark, large and hammer-shaped.

Female. Length, 6.0 mm., ceph. 3.1 mm., abd. 3.0 mm.

Median pale stripe wider than in male and carried to p.l.e., sub-marginal stripe wider and continued to clypeus, black about eyes; eyes same as in male; mandibles, labium and maxillae pale; sternum pale with a dark median forked stripe which fades near labium; coxae pale gray; abdomen much paler than in male, basal mark followed by broken transverse bars on a pale area, sides dark, venter pale; legs much broken; epigynum without distinct lateral ridges in the median

region as in *Pardosa saxatilis* (Hentz), sides slightly angulate about middle, deep lateral depressions.

♂ Cuba; Rio Bayamo.

♂ ♀ Cuba; Havana, Banks Coll.

♀ Cuba; Havana, (Cervera).

Franganillo's description is very short and gives little more than generic characters. As he gives no locality other than "sitios humedos de la isla de Cuba," it is not unreasonable to infer that it is a common species and that he had it from various localities. As the two males seen differ somewhat in color, it is not impossible that the second species described by Franganillo in the same paper, *Pardosa maculata*, is the same.

The male described above is from Rio Bayamo and is much darker than another from Havana. In the latter, the sternum has a dark median forked stripe and the coxae are gray, not black; the palpus has several yellow hairs on the tibia and patella. In a specimen from Lake Worth, Florida, the tibia and patella are thickly covered with yellow hairs, very suggestive of the white hairs found on *Pardosa saxatilis*, but all specimens have the femora dark gray, fading gradually to the pale yellow on tibia and metatarsi.

Pardosa cubana spec. nov.

Figure 27

Female. Length, 4.3 mm., ceph. 2.2. mm., abd. 2.3 mm.

Cephalothorax yellow, eye area black which is continued as two parallel dark stripes from p.l.e. to posterior margin, inner margins irregular, narrow marginal dark line; eyes, anterior row straight, shorter than second row, a.m.e. larger than a.l.e., separated by less than a diameter and from a.l.e. by less than a radius, p.m.e. separated by more than a diameter; clypeus retreating, more than a diameter of a.m.e.; mandibles vertical, three teeth on inferior margin; labium wider than long, tip rebordered; abdomen dark with a pale median stripe broken by cross-bars and dark spots, venter pale; legs, I, II and IV right missing, 4–1–2–3, interrupted dark rings on femora, tibiae and metatarsi, most conspicuous on posterior pairs, spines, I pair, tibia, ventral, 2–2–2–2, apical pair short, others long and overlapping, metatarsus, ventral, 2–2–2, basal and median pairs long; epigynum, area longer than wide, cross piece very wide, median septum short and wide.

Holotype ♀ Cuba; Maisi, 15–16 July, 1936, (Darlington)

This species differs from *Pardosa albopilosa* Franganillo in the very broad cross piece of the epigynum, the smaller size, and the number of spines on the first tibia. It differs from *Pardosa portoricensis* Banks in the very short septum.

Family OXYOPIDAE

Genus Oxyopeidon O. P. Cambridge 1894

Oxyopeidon rana Simon

Hamataliwa grisea Banks, *nec* Keyserling, 1909, p. 167.
Oxyopeidon cubanum Chamberlin, 1925, p. 128, fig. 41; Petrunkevitch, 1929, p. 103, figs. 84-88.

Simon had both male and female from St. Vincent, but he gave no figures. Petrunkevitch gives a detailed description and figures. *Oxyopeidon cubanum* Chamberlin proves to be the same species.

♂ ♀ Cuba; Trinidad Mountains, Mina Carlota, Marsh, 1925, (Salt and Myers)

♂ Cuba; Coast below Pico Turquino, 30 June, 1936, (Darlington)

Oxyopeidon tuberculatum Chamberlin

Oxyopeidon tuberculatum Chamberlin, 1925, p. 129, figs. 42–43.
Hamataliwa grisea Banks, *nec* Keyserling, 1909, p. 167.

This species was based on a female probably two moults from maturity. It is impossible to place it.

Genus Oxyopes Latreille 1804

Oxyopes salticus Hentz

Oxyopes salticus Hentz, 1845, p. 196, pl. 16, fig. 10; Petrunkevitch, 1929, p. 102, figs. 82–83.

This is a common species in the United States as far north as Long Island, New York. It is found in Central America, Brazil, and the West Indies. It is very abundant in collections from Havana and Soledad.

Genus Peucetia Thorell 1870

Peucetia viridans (Hentz)

Oxyopes viridans Hentz, 1845, p. 195, pl. 17, fig. 2; Petrunkevitch, 1929, p. 106, figs. 89–91.

A species common to the southern United States, Central America, and the West Indies. It is found in great abundance in collections from Havana and Soledad.

Family SICARIIDAE

Sub-family LOXOSCELINAE

Genus Loxosceles Lowe 1831

Loxosceles rufescens (Dufour)

Scytodes rufescens Dufour, 1820, p. 203, pl. 77, fig. 5.
Loxosceles rufescens Petrunkevitch, 1929, p. 108, figs. 92–96.

This European species is found in Japan, Madagascar, Mexico, and the southern part of the United States. Petrunkevitch reports it from Puerto Rico. In Cuba, Franganillo reports it from the Sierra de Rangel. It was found in Vilches Cave, Soledad by Banks and Worley during August.

Sub-family SCYTODINAE

Genus Scytodes Latreille 1904

Scytodes blanda spec. nov.

Figures 25, 29

Male. Length, 4.1 mm., ceph. 2.1 mm., abd. 2.0 mm.

Cephalothorax pale with two pairs of converging dark lines that do not meet at the highest portion of the cephalothorax, irregular dark lines above the lateral margins, highest portion about opposite fourth coxae, thoracic portion slopes abruptly to posterior margin; eyes subequal, anterior eyes almost round, more than a diameter from margin of clypeus, lateral eyes very near margin and widely separated; clypeus inclined forward and equal to more than diameter of anterior eye; mandibles pale with a dark stripe, vertical, with a small dark tooth on median edge, fang small; labium longer than wide, sides in-

clined; maxillae one-third longer than labium, tips pointed and almost meeting; sternum pale, heart-shaped, IV coxae separated by more than a diameter; abdomen pale with a few dark dots in transverse rows, venter pale; legs pale with two parallel lines of dark dots, most distinct on femora; palpus pale, tibia plus patella as long as femur, tibia longer than patella and slightly swollen, bulb short, much broader than long, with embolus constricted soon after origin and tip divided in two flattened lobes as figured.

Female. Length, 5.0 mm., ceph. 2.7 mm., abd. 2.4 mm.

Markings on cephalothorax and abdomen same as on male; epigynum, a pair of widely separated oval openings with median margins heavily chitinized, as in *Scytodes fusca*.

Holotype ♂ Cuba; Maisi, 15–16 July, 1936, (Darlington)

Allotype ♀ Cuba; Coast below Pico Turquino, June, 1936, (Darlington)

Paratype ♂ ♀ Cuba; Soledad, San Jose, 1 August, 1931, (Worley)

Paratype ♀ Cuba; Soledad, 1 April, 1936, (Darlington)

Paratype ♀ Cuba; Soledad, 27 November, 1927, (Creighton)

This species is very close to *Scytodes championi* F. O. Cambridge and probably has been confused with it. It differs, however, by the widely separated lateral eyes, the wider clypeus, and in the palpus by the bilobed tip which lacks the tooth near the constriction. The female *S. championi* has never been described.

Scytodes fusca Walckenaer

Scytodes fusca Walck., 1837, p. 272; Petrunkevitch, 1929, p. 113, figs. 97–98.

A common species in northern South America, the West Indies, and southern Florida. The male is very rare.

♀ Cuba; Havana, (Baker)

♀ Cuba; Soledad.

Scytodes hebraica Simon

Scytodes hebraica Simon, 1891, p. 568, pl. 42, fig. 14.
Scytodes bajula Banks, *nec* Simon, 1909, p. 156.

Originally described from St. Vincent, Cambridge found this species in various parts of Guatemala. The male is easily separated from others of the genus by the large spines on the sternum. The palpus is very much like the figure of *Scytodes fusca* Petrunkevitch, Spiders of Porto Rico, p. 114, fig. 98.

Scytodes longipes Lucas

Scytodes longipes Lucas, 1845, p. 73, pl. 1, fig. 1; Petrunkevitch, 1929, p. 116, figs. 99–100.

A common tropical and subtropical spider. It is found on all islands of the West Indies and in all collections from Cuba.

Family PHOLCIDAE

Sub-family PHOLCINAE

Genus Artema Walckenaer 1837

Artema atlanta Walckenaer

Artema atlanta Walckenaer, 1837, p. 656; Petrunkevitch, 1929, p. 119, figs. 102–104.

A widely distributed species throughout the tropics. It is the largest of the Pholcids.

♂ Cuba; Havana, (Aguayo)

Genus Modisimus Simon 1893

Modisimus concolor spec. nov.

Figures 30, 32–34, 36, 38

Male. Length, 1.6 mm., ceph. 0.5 mm., abd. 1.3 mm.

Cephalothorax almost colorless, slightly wider than long, thoracic groove longitudinal, deep, extending from base of eye turret to posterior margin; six eyes, on a cylindrical turret, each eye heavily ringed with black, a.l.e. largest and separated by more than a diameter, directly behind each a.l.e., and partly on the black pigment, is a pair of small brownish spots resembling eyes, posterior row straight, slightly longer than anterior row, p.m.e. separated by more than a diameter and a half and a little larger than p.l.e.; clypeus higher than eye turret and projecting forward slightly; mandibles with an oblique ridge on basal third, edged with a row of short, graduated black bristles, the usual sharp black tooth at median edge; maxillae curved and meeting in front of labium; sternum wider than long, I coxae widely separated and IV coxae separated by more than a diameter; abdomen pale gray with two converging rows of black dots and many whitish blotches, elongate oval, sides with a few black spots, venter

colorless, with a small black spot anterior to spinnerets; legs very long and colorless, without spines but tarsi covered with rows of hairs; palpus, femur with two ventral apophyses, the one near the tip larger, and seen from below, shows a triangular tooth bordered each side by three stout bristles, tibia almost as long as terminal joint.

Female. Length, 2.0 mm.

Cephalothorax with a broad dark stripe from eye turret to posterior margin; eye turret not as high as in the male but arrangement of eyes the same; mandibles without ridge and row of bristles; sternum pale brown; abdomen globose with two converging rows of dark spots and sides mottled as in male; legs very pale brown, sometimes spotted with black; epigynum large for the size of the spider, heavily chitinized with posterior margin of openings fringed with long hairs or bristles directed inward.

Holotype ♀ Cuba; Soledad, garden, from dead banana leaves, 8 August, 1931, (Worley)

Allotype ♀ Cuba; Soledad, garden, 8 August, 1931, (Worley)

Paratypes ♂ ♀ Cuba; Soledad, garden, 8 August, 1931, (Worley)

Paratypes ♂ ♀ Cuba; Soledad, August, 1934, (Darlington)

This species differs from *Modisimus glaucus*, the genotype, by the two apophyses on the femur of the palpus.

Modisimus elevatus spec. nov.

Figures 31, 35, 37

Male. Length, 2.9 mm., ceph. 1.0 mm. long, 1.2 mm. wide, abd. 1.9 mm.

Cephalothorax pale yellow, clypeus dark gray with an irregular median pale stripe, black about eyes and a pale gray median stripe, thoracic groove very deep, extending from base of eye turret to posterior margin, cephalothorax wider than long; eyes eight, turret very high, anterior row procurved, a.l.e. largest of the eight, separated by more than a diameter, a.m.e. very small, separated by about a diameter, posterior row longer than anterior, procurved, eyes subequal, p.m.e. separated by more than two diameters and from p.l.e. by a diameter; clypeus higher than turret and inclined forward; mandibles grayish on outer margin with the usual median black tooth, distal third with scattered stiff black spines or spicules; maxillae curved and tips meeting above the labium; sternum gray with a broad median pale stripe, wider than long, widest between I coxae, IV coxae

separated by a diameter; abdomen deeply emarginate at base, globose, bluish-gray with pattern formed by dark dots, leaving pale lines similar to *Modisimus coeruleolineatus* Petrunkevitch, venter pale; legs badly broken, very long, pale yellow, darker at joints; palpus, femur with two apophyses, a large ventral apophysis on distal third with a few stiff bristles and a large basal apophysis at right angles to distal, tibia more than twice the length of patella, terminal joint very short, not covering the bulb, with a long toothed apophysis.

Female. Broken, abd. 2.0 mm. long.

Color same as in male but pattern on abdomen much more distinct; eye turret almost entirely black; mandibles with the usual black median tooth but lacking the black spicules; epigynum midway between pedicel and spinnerets, deeply chitinized and openings fringed with hairs as figured.

Holotype ♂ Cuba; Soledad, San Jose, summit, 31 July, 1931, (Worley)

Allotype ♀ Cuba; Soledad, Vilches Cave under rocks, 14 August, 1931, (Worley)

Paratype ♂ ♀ Cuba; Soledad, Vilches Cave, August, 1931, (Worley)

Paratypes ♂ ♀ Cuba; Soledad, under logs and leaves, 12 August, 1931, (Worley)

Modisimus elevatus is separated from others in the genus by the very high eye turret, spicules on the mandibles and the male palpus.

Modisimus elongatus spec. nov.

Figures 39–43

Male. Length, 2.0 mm., ceph. 0.5 mm., abd. 1.5 mm.

Cephalothorax wider than long, pale yellow with a faint median stripe from p.l.e. to posterior margin narrowest at thoracic groove, black about eyes; eye turret comparatively low; six eyes, a.m.e. missing, a.l.e. largest, separated by a diameter, posterior row straight, slightly longer than anterior row, eyes subequal, p.m.e. separated by more than a diameter, and from p.l.e. by less than a radius; clypeus higher than turret and concave below turret; mandibles with a small tooth about the middle with a few black spicules that continue to near the tip, usual tooth on median margin; maxillae curving around labium; sternum pale brown, wider than long, widest between I coxae; abdomen more than three times as long as wide, (11 : 35), light gray with

paired elongate dark spots in the median area, venter pale with an elongate dark spot in the middle, dark gray about the spinnerets; legs missing; palpus, femur with a ventral apophysis about middle and a smaller one above the base; terminal joint prolonged in a toothed process which is as long as embolus, bulb much swollen, embolus short and sinuate.

Holotype ♂ Cuba; Soledad, March, 1935, (Salt)

This species is very near *Modisimus sexoculatus* Petr. from Puerto Rico. Both have a blunt tooth on the front of the mandibles, but in the Puerto Rican species this tooth is larger and is covered with stiff hairs. The most striking difference, however, is the abdomen which Petrunkevitch describes as the *Theridion* type, higher than wide, while in *Modisimus elongatus* it is very long, slender, and suggestive of the genus *Micromerys*. Both have six eyes and the palpi are very similar.

Modisimus ovatus spec. nov.

Figures 44–47

Male. Length, 2.0 mm., ceph. 0.8 mm., abd. 1.5 mm.

Cephalothorax pale yellow, wider than long, thoracic groove very deep; eye turret moderately high, eight eyes, anterior row procurved, a.m.e. very small and inconspicuous, almost touching, a.l.e. largest of the eight, diameter apart, posterior row slightly procurved, longer than anterior, eyes subequal and equidistant; clypeus higher than turret; mandibles with the usual sharp black tooth at median edge and the distal third covered with black spicules; sternum almost round, widest between III coxae, pale brown with a median pale stripe, IV coxae separated by a diameter; abdomen, globose, greenish-gray with a pale basal spear mark bordered by fine dark dots and covered with fine hairs; legs pale yellow and very long; palpus, femur with a large, sharp ventral tooth at distal third, patella very short, terminal joint much shorter than tibia, so that bulb is not covered, margin fringed and lobed with one fork much longer than the others, bulb swollen and round, embolus slender.

Holotype ♂ Cuba; Havana, Banks Coll.

This species is related to *Modisimus inornatus* Cambr. but differs in the lobes of the cymbium, the embolus, and the ventral tooth on the femur. Both have the a.m.e. very small and inconspicuous, so that they were not mentioned or figured in the original description of *M. inornatus*. The clypeus is not as high as in the Cuban species.

Modisimus pavidus spec. nov.

Figures 48, 49

Male. Length, 2.6 mm.

Cephalothorax pale with irregular spots on posterior margin, wider than long, eye turret moderately high, dark reddish-brown, thoracic groove deep; eight eyes, seen from above, anterior row procurved, a.m.e. very small, separated by a diameter, a.l.e. separated by a diameter and a quarter, posterior row longer than anterior, seen from above, straight; p.l.e. largest of the eight and on distinct tubercles, p.m.e. smaller than a.l.e., separated by a diameter and a quarter and from p.l.e. by less than a diameter; clypeus inclined forward, with scattered long hairs or bristles directed upward; mandibles vertical, pale, with a transverse, convex carina at basal third, distal third slightly excavate with an irregular mass of dark spicules above the fang groove, the usual dark tooth at margin, fang weak; abdomen globose, bluish-green, darker at base; legs long; palpus of the usual type, femur with two apophyses, the basal small and the distal much larger, area between deeply excavate and gray, patella very narrow, tibia rounded on dorsal side, terminal joint not as long as wide with a single slender brown apophysis with a curved branch at basal third, the apophysis ends in a sharp point that does not reach tip of embolus; seen from inner side the embolus appears as a flat, black, ribbon-like piece with a truncate tip and a black projection at distal third.

Female. Length, 3.0 mm.

Cephalothorax and eyes same as in male; mandibles pale, long, transverse carina missing and excavate area above fang groove without dark spicules; epigynum dark brown, with lateral lobes, their inner margins parallel, so that epigynum is divided longitudinally in three equal areas.

Holotype ♂ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Allotype ♀ Cuba; Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

Paratype ♂ Cuba; Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

Genus Physocylus Simon 1893

Physocylus globosus (Tacz.)

Pholcus globosus Taczanowski, 1873, p. 105; Petrunkevitch, 1929, p. 141, figs. 132–135.

This species has been found from Arizona and New Mexico, south to the northern part of South America, and on several islands of the West Indies. It has been reported from various places in Cuba. At Soledad it was found under the eaves of the house during July and August.

Genus Smeringopus Simon 1890

Smeringopus elongatus (Vinson)

Pholcus elogatus Vinson, Aran. Reunion, Madag., 1864, p. 135; Petrunkevitch, 1929, p. 144, figs. 136–138.

Pholcus tipuloides L. Koch, Arachn. Austr., 1872, **2**, p. 281, pl. 22, fig. 5.

This is a cosmotropical species and has received many names. Roig states that it is common everywhere in Cuba.

♂ ♀ Cuba; Santiago de las Vegas.

Genus Systenita Simon 1893

Systenita coxana spec. nov.

Figures 51, 53

Male. Length, 1.8 mm., ceph. 0.8 mm., abd. 1.0 mm.

Cephalothorax pale yellow, wider than long, cephalic portion small, sharply defined from thoracic and sloping very gradually to thoracic groove, thoracic groove deep; eight eyes, surrounded by black, eye group slightly raised, a.m.e. punctiform on a black spot, a.l.e. largest of eight, separated by less than a diameter, posterior row procurved, p.m.e. slightly larger than p.l.e., separated by more than a diameter and from p.l.e. by less; quadrangle of a.l.e. and p.m.e. wider in front and as wide as high; clypeus slightly inclined forward, fully three times as high as eye area; mandibles vertical, with a median tooth continuing as a serrate ridge on apical third, suggestive of *Artema*, fang weak; labium fused to sternum, wider than long; maxillae inclined over labium; sternum pale, convex, wider than long, extending between IV coxae as a broad lobe; all coxae much swollen on ventral side, posterior largest, all with a few spicules; abdomen greenish-blue with darker blue spots, globose, smooth, venter pale with fold very near the spinnerets; legs, III right missing, 1–4–2–3, pale with no dark rings or spines, few hairs; palpus of the usual Pholcid type, trochanter with no spur near apex, tibia twice as long as patella with row of four long bristles on dorsal side, tarsus with one long apophysis with bifid tip, almost as long as and parallel to embolus, embolus with a short spine near tip.

Holotype ♂ Cuba; Mountains North of Imias, 3,000–4,000 feet, 25–28 July, 1936, (Darlington).

Systenita incerta spec. nov.

Figures 50, 52

Male. Length, 2.5 mm.

Cephalothorax pale, low and flat, slightly wider than long, (7:6), cephalic portion slightly raised, sharply defined and sloping gradually to thoracic groove, thoracic groove long; six eyes, each one heavily circled with black, eye area oval, wider than long, a.l.e. largest, separated by more than a diameter, posterior row procurved, slightly longer than anterior, p.m.e. larger than p.l.e., separated by more than three diameters and from p.l.e. by almost a diameter, lateral eyes separated by diameter of p.l.e.; clypeus inclined forward, equal to once and a half eye area; mandibles vertical, basal third swollen, ending with a transverse carina, distal half slightly roughened, usual small, dark teeth on superior margin of fang groove at median edge; labium fused to sternum, wider than long; maxillae almost surrounds labium; sternum white, two-thirds as long as wide, IV coxae separated by more than a diameter; abdomen oval, pale with a few colorless hairs, venter pale; legs broken, very long, tarsi short; palpus of the usual Pholcid type, no spur on trochanter, femur with basal apophysis a large round knob, distal apophysis pointed, patella small, tibia with dorsal side rounded, terminal joint not as long as wide, with long apophysis with many branches but longest not as long as embolus, bulb swollen, embolus almost black, flattened and curved towards bulb.

Female. Length, 2.1 mm.

Cephalic portion not as high as in male and eyes of anterior row not as widely separated; epigynum just anterior to middle of the venter, a protruding hood at base, over a large oval clear area.

Holotype ♂ Cuba; Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

Allotype ♀ Cuba; South Side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

The generic position of *Systenita coxana* and *S. incerta* is doubtful. Simon based the genus on a Venezuelan species that has six eyes, eye area longer than wide, posterior row procurved, mandibles weak with an oblique carina and minute teeth on the fang groove, and an elongate abdomen; the palpus is stated to have no spur on the trochanter, femur with a narrow base, widening to a ventral spur, tibia longer than patella

and a single apophysis on tarsus. The two species probably belong to the same genus, although *S. coxana* has minute a.m.e. which are about to disappear and a globose abdomen, and *S. incerta* has very long legs. *Hedypsilus*, another genus with six eyes, the posterior row recurved and a low eye turret, also from Venezuela, is compared with *Modisimus*. The swollen coxae of *S. coxanus* is an unusual character in this family and probably occurs in the male only.

Sub-family LEPTOPHOLCINAE

Genus Micromerys Bradley 1877

Micromerys dalei Petrunkevitch

Micromerys dalei Petrunkevitch, 1929, p. 150, figs. 144–148.
Leptopholcus delicatulus Franganillo, 1930, p. 15.
Leptopholcus conicus ibid., 1931, p. 286; ibid., 1934, p. 153; ibid., 1936, p. 46.

Male. Length, 3.3 mm., ceph. 0.6 mm., abd. 2.8 mm.

Cephalothorax pale, wider than long, anterior margin truncate, low with no thoracic groove; eyes, a.m.e. small black dots, separated by at least three diameters, other eyes subequal on a low tubercle, in two widely separated groups, connected by a ridge; clypeus vertical, narrow; mouth parts weak; sternum as wide as long; abdomen cylindrical, very long and narrow, pale with four pairs of elongated dark spots, abdomen continued beyond the spinnerets in a short lobe; legs, several missing, very long and slender, tarsi very short; palpus pale, trochanter produced in a long slender spine at an angle to femur; femur from a narrow base, suddenly enlarging, patella short, tibia long and swollen, cymbium with a long L-shaped process, flattened with a dark brown margin, tip truncate, inner margin hyaline with a scant fringe of long hairs, bulb pale, relatively small, less than half as large as tibia, with two very dark processes, one of which is flattened with a serrate margin and ends in a long slender point.

Female. Length, 5.2 mm., ceph. 0.8 mm., abd. 4.2 mm.

Cephalothorax pale, flat and low, wider than long, (7:6), no thoracic groove; eyes as in male but lateral tubercles not as high; mouth parts weak; sternum wider than long, (4:3); abdomen five times as long as cephalothorax, cylindrical and very slender, pale, no markings, with a constriction about the middle, venter pale; abdomen extends beyond the spinnerets; anterior legs missing, legs very long and slender, tarsi short; epigynum covers a large area but because it is so faintly chitinized, it is impossible to trace various parts, possibly because it lacks one moult of maturity.

♂ Cuba; Oriente, Los Llanos, 1,000–2,000 feet, 16–20 July, 1936, (Darlington).

♀ Cuba; South Side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

The genus *Leptopholcus* was established by Simon in the Hist. Nat. Araignées, 1893, 1, p. 474, for two species, one from East Africa and the other from Ceylon. It differs from *Micromerys* in the presence of two very small a.m.e. The Cuban specimens have these eyes reduced almost to pin-points. Through the kindness of Dr. Petrunkevitch, immature specimens of *Micromerys dalei* from Puerto Rico have been compared with the Cuban specimens. The palpus agrees perfectly with the figures of *M. dalei*.

Franganillo described *Leptopholcus delicatulus* in 1930 from females collected at Sierra del Cuzco and compared the eyes with the figures of *L. signifer* Simon. The following year, he described a second species, *L. conicus*, from the Sierra de Rangel, and in 1936 he republished the description of the latter in "Los Aracnidos de Cuba hasta 1936" but he failed to mention the first species described. The two are probably the same, as the differences consist principally in the color pattern.

Sub-family NINETIDINAE

Ninetella gen. nov.

Cephalothorax almost round, convex, with a distinct Y-shaped depression posterior to the cephalic portion; eye area compact, eight eyes, in two groups, six sub-equal eyes and a pair of very minute ones, clypeus high and inclined forward; sternum convex, almost round, posterior coxae well separated; legs long and slender; male with a long, forward projecting tooth on basal half of mandibles.

Type *Ninetella pulchra* spec. nov.

This genus is very similar to *Ninetis* Simon, but has a distinct longitudinal groove and the a.m.e. have moved back.

Ninetella pulchra spec. nov.

Figures 54–57

Male. Length, 1.1 mm., ceph. 0.5 mm., abd. 0.6 mm.

Cephalothorax pale yellow, almost as broad as long, slightly convex, attenuate in front, with a distinct Y-shaped mark which forms the thoracic groove; six sub-equal eyes in two compact groups separated

by a diameter, and a pair of easily overlooked minute eyes close to posterior row of eyes, these minute eyes may be the a.m.e. moved back; clypeus high, at least twice the width of the eye area, inclined forward; mandibles vertical, with a slender, forward projecting process about the middle; mouth parts small and weak; abdomen globose, pale gray covered with long hairs or bristles, venter gray, without markings, spinnerets about midway between epigstric fold and tip of abdomen; legs, 1-2-3-4, long and slender, with no spines, femora slightly incrassate; palpus, femur slender at base, widening at distal portion with a distinct tooth on ventral side, patella very small, tibia swollen and globose, terminal joint of the usual Pholcid type with one apophysis the length of the bulb.

Female. Length, 1.5 mm., ceph. 0.7 mm., abd. 1.0 mm.

Coloring same as in male, posterior eyes more widely separated, mandibles without tooth; epigynum a rectangular area with a reflex margin each side, each bearing two corneous points, turned back and out, so that the upper point touches the sternum.

Holotype ♂ Cuba; Soledad, Vilches pasture, 3 July, 1932, (Bates and Fairchild)

Allotype ♀ Cuba; Soledad, Vilches pasture, 3 July, 1932, (Bates and Fairchild).

Paratypes 2 ♂ 1 ♀ Cuba; Soledad, Vilches pasture, 3 July, 1932, (Bates and Fairchild).

This species seems to be near *Ninetis subtilissima* Simon from Arabia, but it has a thoracic groove, the small eyes have almost disappeared, and have moved back. The legs are not as long as in the typical Pholcids.

Family DICTYNIDAE

Genus Dictyna Sundevall 1833.

Dictyna cubana spec. nov.

Figures 58, 62, 63

Male. Length, 1.5 mm., ceph. 0.8 mm., abd. 0.8 mm.

Cephalothorax gray, much darker on cephalic portion, thoracic groove faint; eyes, anterior row slightly recurved, a.m.e. oval and oblique, separated by a little more than long diameter, posterior row slightly procurved so that lateral eyes are touching, p.m.e. separated by a little more than a diameter, and by less than half a diameter from p.l.e.; quadrangle of median eyes narrower in front and as high as

space between p.m.e.; clypeus higher than quadrangle; mandibles long, basal half excavate on inner margin, lower half straight with a chitinous blade-like ridge, a small, sharp tooth directed forward on exterior margin near base, fang short; labium as wide as long and tip narrowed; maxillae inclined over labium; sternum a broad oval, slightly longer than wide, tip not prolonged between IV coxae, a dull yellow with black about the margin; abdomen oval, base extending in a pointed knob over cephalothorax, dark gray with six graduated pale transverse bars, separated by dark lines, those near apex bent like cheverons, venter pale gray, almost white; legs cream-white covered with rows of hairs, calamistrum poorly defined; palpus, patella globose or greatly swollen on dorsal side and only slightly smaller than cymbium, tibia very short with a dark bifid lobe on dorsal side, opposite a small knob at tip of patella, on the outer side a triangular flattened lobe which interlocks with a small triangular lobe on the side of the patella, cymbium but little shorter than palpal organ.

Holotype ♂ Cuba; Soledad, 22 August, 1933, (Weber).

This species is related to *Dictyna floridana* Banks. Both have the patella greatly swollen and the clypeus very high, but the Cuban species is much smaller, the abdominal markings are quite different, the excavate area of the mandibles is smaller, the tibia of the palpus is broader, and the dorsal lobe is a different shape; the cymbium is smaller and shorter. The swollen patella of the palpus distinguishes it from the other Cuban species.

Dictyna flavipedes spec. nov.

Figures 59–61

Male. Length, 1.5 mm., ceph. 0.8 mm., abd. 0.8 mm.

Cephalothorax pale brown with a pale median area from p.l.e. to posterior margin, cephalic portion high; eyes, anterior row slightly procurved, equidistant, a.m.e. smallest, separated by a diameter and a half, posterior row procurved so that lateral eyes are touching, equidistant and subequal; quadrangle of median eyes wider behind and as high as space between p.m.e.; clypeus as high as quadrangle; mandibles vertical, two-thirds as long as cephalothorax, excavate on median edge and bowed on exterior margin, fang short; sternum heart-shaped; abdomen with a pale median area, sides dark, venter pale; calamistrum of a few curved hairs on the middle three-fifths of metatarsus; palpus, tibia about as long as wide, much wider

at basal than at distal end, with a sharp basal spine, not bifid, palpal organ of the characteristic type.

Holotype ♂ Cuba; Havana, (Baker), Banks Coll.

Paratype ♂ Cuba; Soledad, (Banks and Worley).

This species is easily distinguished from others by the short tibia of the palpus which has a single basal spine. Undoubtedly it will be found in other parts of Cuba. In 1936, Franganillo described *Dictyna albopilosa* from Cuba and compared it to *D. parietalis* Camb., also reported by Petrunkevitch from Puerto Rico. The figure of the palpus is very indistinct but it shows that the tibia is much longer than wide, and the palpal organ is about two-thirds as long as the cymbium; it therefore differs in these two characters from *D. flavipedes*. Franganillo fails to mention whether the tibial spine is bifid.

Genus Scotolathys Simon 1884

Scotolathys cavaticus spec. nov.

Figures 64, 67

Female. Length, 2.2 mm., ceph. 1.0 mm. long, 0.6 mm. wide, abd. 1.3 mm.

Cephalothorax pale yellow, darker at front margin, long and narrow, sides almost parallel, sloping gradually to thoracic groove, posterior quarter slopes abruptly, thoracic groove short; six eyes, in two compact groups, each eye heavily ringed with black, posterior row slightly procurved and a little longer than anterior row; p.m.e. separated by about two diameters and from p.l.e. by half a diameter, anterior eyes separated by more than three diameters and almost touching p.l.e.; clypeus less than a diameter of a.l.e.; mandibles large and slightly porrect, little darker than cephalothorax, four small, subequal teeth on inferior margin of the fang groove and five small teeth opposite on the superior margin with a carina at base of the fang; labium longer than wide with rounded margins; maxillae twice as long as labium, inclined towards labium with a sharp angle on outer edge; sternum longer than wide, widest between II coxae, slightly convex with scattered hairs, ending in a point between IV coxae, IV coxae separated by half a diameter; abdomen pale flesh-color with scattered dark hairs, twice as long as wide, venter pale with darker hairs; legs, 4-1-2-3, about same color as cephalothorax, with many hairs, spines, I pair, tibia, ventral, 2-2, median and basal, less than diameter of

joint, lateral, O, metatarsus, ventral, 2-2, small and inconspicuous, all patellae with prominent retolateral lobe; calamistrum a single row of long, fine curved hairs covering more than basal half of IV metatarsus; epigynum two large oblique oval dark areas beneath the skin, separated by a septum with heavily chitinized margins, openings probably depressions each side of the septum.

Holotype ♀ Cuba; Soledad, Vilches Cave, July, 1932, (Bates and Fairchild).

Paratype ♀ Cuba; Soledad, August, (Leavitt).

The generic position of *Scotolathys cavaticus* is uncertain. It differs from the genotype, *Scotolathys simplex* by widely separated a.m.e. and spines on the legs, but until a male is found it is best to leave it here.

Family THERIDIIDAE

Sub-family PHOLCOMMATINAE

Genus Paidisca Crosby and Bishop 1926

Paidisca simplex spec. nov.

Figure 66

Female. Length, 2.0 mm., ceph. 0.9 mm., abd. 1.2 mm.

Cephalothorax chestnut brown, anterior margin narrowed to half the greatest width, no thoracic groove, cephalic portion not distinct from thoracic; eyes cover entire width of head, anterior row straight by upper margins, a.m.e. smallest of the eight, separated by radius and from a.l.e. by almost a diameter, posterior row slightly procurved, p.m.e. largest of the eight, separated by a radius and from p.l.e. by a diameter, lateral eyes touching and subequal; quadrangle of median eyes much narrower in front and higher than wide; clypeus as high as quadrangle and slightly convex; mandibles vertical, inner margins almost meeting for basal half, then diverging for the oblique fang groove, fang groove long and oblique, superior margin with four small teeth; labium very narrow, one-third width of sternum, suture between sternum and labium very faint; maxillae more than three times as long as labium and inclined over labium; sternum dark brown, convex and granulate, almost as wide as long, (4.5 : 5), widest between II coxae, IV coxae separated by a diameter and a half, sternum carried between coxae and ending as a truncate lobe between IV coxae;

pedicel distinctly corneous; abdomen a pale brownish-yellow, sparingly covered with very stiff hairs, broadly oval; (13 : 10), does not extend over cephalothorax, muscle spots faint, venter pale, ventral furrow very near spinnerets; legs, 1–4–2–3, pale brown, rather short, comb on IV tarsus, tarsi about as long as metatarsi, I femur compressed laterally, no spines; epigynum very near pedicel, seen laterally the anterior portion projects from the plane of the abdomen as a dark curving hood, beneath are widely separated dark sacs and tubes below the skin, the openings apparently in a straight line at the fold.

Holotype ♀ Cuba; Soledad, 1–11 August, 1934, (Darlington).

This small species differs from the genotype, *Paidisca marxi* (Crosby), because of the small epigynum, lack of spines on the first femur and the slightly larger size. The arrangement of eyes is the same, and the sternum is even broader between the posterior coxae.

Genus Ulesanis L. Koch 1872.

Ulesanis americanus Emerton

Ulesanis americanus Emerton, 1882, p. 28, pl. 6, fig. 1.

This small spider is found from New England south to Florida. An adult female was taken by Dr. Darlington at an elevation of 6,000 feet on Pico Turquino during June 1936. It is the only representative of the genus in North America, but three species have been described from Brazil and Chili by Keyserling and Nicolet.

Sub-family ASAGENINAE

Genus Asagena Sundevall 1833

Asagena quadrimaculata O. P. Cambridge

Asagena quadrimaculata O. P. Cambridge, 1896, **1**, p. 189, pl. 23, fig. 12; ibid., 1902, **2**, p. 378, pl. 35, fig. 17.

Originally reported from Guatemala, this species has been collected since in Venezuela and St. Vincent. Petrunkevitch did not find it in Puerto Rico and Franganillo has not reported it from Cuba. A dried male was found in the shrubbery at Soledad, 3 August, 1931 by Worley.

Genus Coleosoma O. P. Cambridge 1882

Coleosoma floridana Banks

Figures 70, 71

Coleosoma floridana Banks, Can. Ent., 1900, **32**, p. 98.
Coleosoma blandum Keyserling, *nec* Cambridge, 1884, p. 212, pl. 10, figs. 127.
Theridion interruptum Banks, 1908, p. 205, fig. 9.
Lithyphantes oophorus Petrunkevitch, 1930, p. 170, figs. 8, 9.

Male. Length, 1.7 mm., ceph. 0.7 mm., abd. 1.0 mm.

Cephalothorax chestnut-brown, clouded with black about the margin, evenly rounded at each end, thoracic groove wanting but there is a circular depression at the end of the cephalic portion; eyes, anterior row slightly recurved, subequal and equidistant, separated by about a diameter, posterior row straight, eyes equidistant, subequal and separated by slightly more than a diameter; quadrangle of median eyes slightly wider behind and a little wider than high; clypeus convex and higher than quadrangle; mandibles vertical, attenuate and weak; labium very narrow, much wider than long; sternum triangular, very wide between I coxae, IV coxae separated by less than a diameter; abdomen cylindrical, more than twice as long as wide, slightly constricted below the middle, basal portion is much flattened, narrowed, deeply bifid and carried over cephalothorax, the pedicel showing distinctly between the lobes, the depressed portion is carried on the ventral side as a sheath which extends half way to spinnerets, basal shield olive, followed by two large blotches containing irregular white spots, venter more than half covered by shield followed by a black band or spot which does not reach the sides; legs, 1–4–2–3, yellow with a distinct black stripe on prolateral side of each femora at basal half which connects with a black spot on trochanters, tip of tibiae and base of metatarsi of posterior pairs black, no spines on legs but many hairs and long bristles; palpus small and seen from the side, tibia and patella of equal length, palpal organ simple with a strong black process at the tip.

♂ ♀ Cuba; Soledad, garden, August, 1931, (Worley).

The genus *Coleosoma* Cambridge was based on a male from Ceylon, *Coleosoma blandum*. The generic characters are the stridulating cavity at the base of the abdomen which is chitinized, deeply bifid in the middle, and is found only in the male. *Coleosoma floridana* was described from a male from Punta Gorda, Florida, probably recently moulted, as the stridulating plate is not darkened. *Theridion inter-*

ruptum Banks was described from a female, probably one moult from maturity. Keyserling determined a male from Crescent City, Florida, in the Marx Collection as *Coleosoma blandum*.

In the Biol. Centr. Amer., 1895, **1**, p. 154, pl. 19, fig. 12, O. P. Cambridge describes also from males, a second species, *Coleosoma flavipes* from Teapa, Tabasco, and Guatemala. It is possible that the Central American species is the same as the one from Florida and Cuba, since it has been reported from the Galopagos Islands. Cambridge states that the Central American species has the abdomen entirely black, and the constriction at the middle is apparently more marked than in Cuban specimens; also the strong black spine is not shown in the figure of the palpus. Both have the black stripes on the femora and the black spot at the tip of the posterior tibiae. Simon states in his report on Spiders of St. Vincent, that *Coleosoma blandum* Camb. is found there.

Genus Lithyphantes Thorell 1870

Lithyphantes septenmaculatus Keyserling

Lithyphantes septenmaculatus Keyserling, 1884, p. 141, pl. 6, fig. 88; Petrunkevitch, 1930, p. 169, fig. 6, 7.

Originally described from a female from Florida, this species was found by Petrunkevitch at various places in Puerto Rico. Females are in collections from Havana, Soledad, Isle of Pines, and the Oriente. The male has never been found.

Sub-family LATRODECTINAE

Genus Dipoena Thorell 1870

Dipoena cubana spec. nov.

Figure 82

Male. Length, 1.8 mm., ceph. 0.8 mm., abd. 1.0 mm.

Cephalothorax pale yellow with dark marginal line and shaded with gray from posterior eye row to thoracic groove, thoracic groove transverse, thoracic portion high, cephalothorax as wide as long, no radial striae; eyes, anterior row procurved; a.m.e. carried forward on a lobe, slightly larger than a.l.e., separated by almost two diameters, and from a.l.e. by a radius, posterior row straight or a little recurved,

eyes equidistant, p.m.e. largest of the eight and separated by less than a diameter, lateral eyes touching; quadrangle of median eyes wider in front and not as high as wide; clypeus vertical, higher than quadrangle; mandibles vertical, attenuate and weak; labium pale, very narrow, apparently fused to sternum; maxillae surrounds labium; sternum pale with a narrow marginal black line, triangular, wider than long, IV coxae separated by more than a diameter; abdomen globose, pale, with a median row of black spots and larger lateral spots, and scattered small bristles from corneous pits, venter black from pedicel to fold, a black ring around spinnerets, pale gray between fold and spinnerets; legs pale without markings, patellae with bristle at tip, tibiae, dorsal, 2 long bristles, basal and median, I tibia, prolateral, 3 long bristles; palpus short, patella and tibia of equal length; free parts of palpal organ at distal half, embolus black, tip, after an abrupt turn, rests against a broad white lobe which reaches the tip of cymbium, on each side are smaller obtuse lobes.

Holotype ♂ Cuba; Soledad, August, 1931, (Banks).

The genus *Dipoena* is widely distributed, but no species have been reported from Cuba. In 1897, Simon described three species from St. Vincent, from two males and a female. *Dipoena cubana* differs from these because of the lack of rings on the legs and the markings on the abdomen.

Genus Latrodectus Walckenaer 1805

Latrodectus geometricus C. Koch

Latrodectus geometricus C. Koch, 1841, **8**, p. 117, pl. 284, fig. 684; Petrunkevitch, 1930, p. 175, figs. 14–16.

A cosmotropical species known only from the female. A few specimens have been found at Havana.

Latrodectus mactans (Fabricius)

Aranea mactans Fabricius, 1792, **2**, p. 410; Petrunkevitch, 1930, p. 172, figs. 10–13.

This species is found in all parts of the United States, Central and South America, and the West Indies. It is very common in the southern states and in some parts of the West Indies. It shows great variation in the amount of color on the abdomen. It has been reported from all parts of Cuba.

Sub-family ARGYRODINAE

Genus Conopistha Karsch 1881

Conopistha americana (Tacz.)

Ero americana Taczanowski, 1873, p. 57.
Argyrodes argentiola O. P. Cambridge, 1894, p. 128, pl. 16, fig. 4.
Argyrodes aurae ibid., 1896, p. 207, pl. 26, fig. 1.
Argyrodes americana F.O.P. Cambridge, 1902, **2**, p. 403, pl. 38, fig. 4; Petrunkevitch, 1930, p. 185, figs. 27, 28.

First described from a female from Uassa, French Guiana, this little Conopistha has been found in Central America, Brazil, and many of the islands of the West Indies. In the male, the clypeus is vertical, and the transverse groove has no lateral excavations. Excellent figures are given in the Biol. Centr. Amer., and by Petrunkevitch.

Conopistha caudata (Tacz.)

Ero caudata Taczanowski, 1873, p. 58.
Argyrodes caudatus, Keyserling, 1884, p. 198, pl. 9, fig. 119; Petrunkevitch, 1930, p. 182, figs. 23–26.

A male of this species was found in the garden at Soledad during May 1936 by Dr. Darlington. It belongs to the section of the genus which has a rounded tip to the palpus. Petrunkevitch describes his specimens from Puerto Rico as distinctly pink with small silver spots. The Cuban male is black with very few silvery spots, but it has the characteristic protuberances on the abdomen and the lobe beneath the eyes with the mass of upturned hairs.

Conopistha elongata spec. nov.

Figures 68, 69, 75, 76

Male. Length, 3.2 mm., ceph. 1.4 mm., abd. 2.0 mm.

Cephalothorax brown, almost twice as long as wide, horn starts from the margin of clypeus and ends in an obtuse knob below the eye tubercle, eyes, a.m.e. largest, separated by less than a diameter at tip of the horn, p.m.e. at base of the horn and separated by more than a diameter, lateral eyes subequal, contiguous and behind p.m.e. so that the posterior row is strongly recurved; quadrangle of median eyes almost square; sternum and mouth parts brown; abdomen silvery with a median dark stripe from base to rounded apex, carried beyond spinnerets, and dorsum on the same plane as cephalothorax, venter

brown, with wide margin of darker brown with deep indentations in front of spinnerets, two pairs of silvery spots near tip, spinnerets nearer base than tip; legs, I pair very long, femur bent, each joint darker at tip; palpus, patella swollen, one half as long as femur, tibia about one-third as long as patella, tip of cymbium very broad and deeply notched, embolus small and inconspicuous, heavy black piece in lobe, thick and heavy with a sharp hook on inner margin.

Female. Length, 3.0 mm., abd. 2.4 mm. long, 2.6 mm. high.

Cephalothorax chestnut-brown; eyes, anterior row recurved, a.m.e. largest of the eight, carried forward on a low lobe, separated by a diameter and a half, posterior row straight, eyes equidistant, p.m.e. separated by a diameter and a half, lateral eyes touching; quadrangle of median eyes almost square; clypeus higher than quadrangle with a deep groove below anterior row of eyes; abdomen globose, with a small cone projecting backwards, rather than upwards, with a median dark stripe that extends to tip of cone and a narrow dark cross-bar at base of cone, remainder of dorsum silvery, large dark lateral spots as in *Conopistha jucunda* O. P. Cambr., venter pale yellow with a pair of silvery spots anterior to spinnerets; legs, I pair missing, femora pale with a pair of dark lateral lines, tibiae, darker with broad dark rings at base and at tip; epigynum a large, truncate lobe protruding from plane of venter with free half brown and basal portion black, impossible to see any structure.

Holotype ♂ Cuba; Soledad, garden, 19 August, 1931, (Worley).

Allotype ♀ Cuba; Soledad, garden 19 August, 1931, (Worley).

This species belongs to the group with a horn in the male between the margin of the clypeus and the eye area. It is much larger than *Conopistha nephilae* (Tacz.) The cephalothorax is more elongate, and in the female the cone on the abdomen is short and extends backward. Both sexes have the median dark stripe and the large dark spot as in *C. jucunda* (O. P. Cambr.) The eye arrangement is similar to *C. argentata*, originally described from Ceylon and later identified from Madagascar and the Amazon. F. O. P. Cambridge reports specimens of this species from Mexico, identified by O. P. Cambridge as *A. argentatus*, but it is not improbable that these are distinct from the species found in Ceylon.

Franganillo has identified *C. jucunda* from Cuba and has described a new species, *A. cylindricus* from the Oriente with the abdomen lacking any dorsal markings and with a similar abdominal process. His figure of the palpus is from a photograph and the parts are impossible to distinguish.

Conopistha nephilae (Taczanowski)

Argyrodes nephilae Tacz., 1873, p. 51; Keyserling, 1884, p. 184, pl. 8, fig. 110; Petrunkevitch, 1930, p. 179, figs. 19–22.

Taczanowski described this species from specimens from Uassa, French Guiana, but he did not figure it. Keyserling undoubtedly had the type, and his figures must be considered as based on the type material. The species is common in the southern United States, Bermuda, Guiana, Brazil, Peru, and is reported from most of the islands of the West Indies. It is abundant in the garden at Soledad.

Conopistha obtusa (O. P. Cambridge)

Argyrodes obtusus O.P. Cambridge, 1880, p. 338, pl. 30, fig. 17; F.O.P. Cambridge, 1902, **2**, p. 403, pl. 38, fig. 3; Petrunkevitch, 1930, p. 187, figs. 29–32.

Several males were taken in the garden at Soledad by Worley during August, 1931. All the specimens were dark and the abdomen long, rather than rotund, but the tip of the abdomen shows three small black tubercles as figured by O. P. Cambridge in 1880 and again more fully in the Biologia. The type is from the Amazon, but it has been found since in Guatemala and by Petrunkevitch in Puerto Rico.

Conopistha trigonum (Hentz)

Theridium trigonum Hentz, 1850, p. 280, pl. 9, figs. 24, 25.
Argyrodes trigonum, Emerton, 1882, p. 23, pl. 5, fig. 1.

This species is found all over the United States and Mexico. Petrunkevitch did not find it in Porto Rico.

♂ ♀ Cuba; Soledad, garden, 10 August, 1931, (Banks).

Genus Rhomphaea L. Koch 1872

Rhomphaea remota spec. nov.

Figure 74

Male. Length, 7.0 mm., ceph. 1.2 mm., I femur 5.2 mm.

Cephalothorax pale yellow with lateral margins and area posterior to thoracic depression shaded with gray, dark converging stripes from

p.m.e. to depression and from a.m.e. to margin of clypeus, thoracic depression transverse and one-third distant from posterior margin; eyes on a low, flattened tubercle, anterior row recurved, a.m.e. separated by more than a diameter and touching the much smaller a.l.e., posterior row procurved, p.m.e. and a.m.e. subequal, lateral eyes touching and subequal; quadrangle of median eyes slightly narrower behind and as high as wide, distinct groove below anterior row of eyes; clypeus slightly convex and protruding, higher than quadrangle; mandibles weak, pale with a continuation of a dark stripe from the clypeus; labium triangular and fused to sternum; sternum slightly convex; abdomen silvery, with indistinct brown lateral stripes and scattered small black dots, post-abdomen prolonged in a cylindrical tubercle nearly four times the length from pedicel to spinnerets; legs much broken, III pair only complete, tibia longer than metatarsus and metatarsus longer than tarsus, I femur with a narrow dark lateral line; palpus, femur slightly longer than cephalothorax, tibia twice the length of patella and almost twice the length of tarsus, palpus very simple as figured.

Holotype ♂ Cuba; Trinidad Mountains, Buenos Aires, 2,000–2,500 feet, 9 May, 1936, (Darlington).

This species belongs to *Rhomphaea* as defined by Simon in the Histoire Naturelle des Araignées, rather than *Ariamnes* because the clypeus in distinctly inclined forward and the tibiae are longer than the metatarsi. Possibly it may be the species that Franganillo has identified as *Ariamnes flagellum* Dol., which is from the East Indies. Franganillo has also reported *Rhomphaea projicieus* Cambr. from Oriente. This species in the male, has a long process from the eye area, as in *Argyrodes*, and in both sexes the tip of the abdomen has a small spine.

Genus Spintharus Hentz 1850

Spintharus flavidus Hentz

Spintharus flavidus Hentz, 1850, p. 284, pl. 10, fig. 8; Emerton, 1882, p. 28, pl. 5, fig. 7.

A common species from Massachusetts southward. It is found in Mexico, Guatemala, and Panama. Simon had it from St. Vincent and Petrunkevitch records it from Puerto Rico. Both males and females have been found at Soledad and the Trinidad Mountains by Salt and Darlington, and from the south side of Pico Turquino by Darlington.

Sub-family THERIDIINAE

Genus Achaea O. P. Cambridge 1882.

Achaea luculenta spec. nov.

Figures 83, 84

Female. Length, 2.0 mm., ceph. 0.8 mm., abd. 1.3 mm.

Cephalothorax orange yellow, shining, rather low, sides evenly rounded, anterior margin less than half the greatest width, no thoracic groove; eyes almost cover the width of the head, anterior row slightly procurved, subequal, a.m.e. dark, on a lobe that projects forward slightly, separated by a diameter and a half, and from a.l.e. by half a diameter, posterior row straight by upper margins; p.m.e. slightly the largest of the eight, separated by a scant diameter and from p.l.e. by more than a diameter, lateral eyes subequal and touching; quadrangle of median eyes wider in front and as high as wide; clypeus convex and as high as quadrangle; mandibles yellow, no boss, vertical, cone-shape, fang groove short, impossible to see the teeth; labium wider than long, tip rounded; maxillae twice as long as labium, slightly inclined, tips straight and black; sternum yellow, almost as wide as long, widest between I coxae, ending in a broad truncate lobe which extends between IV coxae, so that the latter are separated by more than a diameter; abdomen rose-colored, a broad oval, base narrow and slightly notched, widest in posterior half, extending in a cone above the spinnerets so that above the spinnerets the abdomen is four-fifths as high as long, dorsum and sides with long colorless hairs, about the cone are pale converging lines, venter little paler than dorsum, colulus present, spinnerets form a small compact group; legs, 1–2–4–3, not differing greatly in length, coxae and trochanters white, other joints dark gray with rows of long hairs or bristles, no spines, tarsi shorter than metatarsi, comb on IV tarsus of 5 or 6 slightly curved bristles; epigynum a rather small convex area with a chitinized concave opening near the anterior end, below can be seen faintly the darker tubes beneath the skin.

Holotype ♀ Cuba; Ciénaga de Zapata, Central Covadonga, 16 September, 1936, (Davenport).

This is a very strikingly marked species with a yellow cephalothorax, rose abdomen and almost black legs. The generic position is doubtful. The genus *Achaea* was described from a male by O. P. Cambridge in 1882 in the Proc. Zool. Soc. London, p. 423 as *Achaea insignis*, which was afterwards identified as *Argyrodes trapezoides* Tacz. The genus is

separated from *Theridion, Chrysso* and *Thwaitesia* by the very large a.m.e. that are carried forward on a lobe. This may be a sexual character for in the same paper, Cambridge describes a female as *Thwaitesia? diversa*, and he failed to mention the size of the a.m.e., although he notes the eyes of the posterior row. It is therefore, possible that they were not conspicuously large. Keyserling in the Theridiidae, 1884, **1**. p. 102, identifies this species as the female of *Achaea insignis*, for he probably saw the Cambridge and Taczanowski types. He also redescribed the genus. However, he does not stress the size of the a.m.e. and therefore the difference may be sexual rather than generic. F. O. P. Cambridge in the Biol. Centr. Amer., 1902, **2**, p. 400, knew the genus from two species only, both males. This species differs from the typical members of *Theridion* by the broad lobe at the end of the sternum that extends between the IV coxae, a character never found in that genus.

Genus Anelosimus Simon 1891

Anelosimus studiosum (Hentz)

Theridion studiosum Hentz, 1850, p. 275, pl. 9, fig. 5.
Anelosimus studiosum, F.O.P. Cambridge, 1902, p. 395, pl. 38, figs. 16, 17.

S. C. Bruner took a female of this social spider at Sierra de Cobre. It was described from South Carolina and Alabama, and has been found in many of the southern states. F. O. P. Cambridge reports it from Mexico, Guatemala, Colombia, Venezuela, Peru, Brazil, and from St. Vincent. Petrunkevitch did not find it in Puerto Rico.

Genus Chrysso O. P. Cambridge 1882.

Chrysso albomaculata O. P. Cambridge

Figures 78, 81

Chrysso albomaculata O.P. Cambridge, 1882, p. 429, pl. 30, fig. 6; Keyserling, 1884, p. 152, pl. 7, fig. 94.
Steatoda albomaculata, F.O.P. Cambridge, Biol. Centr. Amer., 1902, p. 385, pl. 36, figs. 18, 19.

Female. Length, 2.4 mm., ceph. 0.8 mm., abd. 1.7 mm. long, 1.2 mm. wide.

Cephalothorax a bright brown with a darker U mark on posterior half, anterior margin about half the greatest width, sides evenly

rounded, thoracic groove a transverse depression; eyes cover width of head, anterior row recurved, a.m.e. largest of the eight, separated by more than a diameter and from a.l.e. by half a diameter, posterior row straight, eyes subequal and equidistant, lateral eyes touching; quadrangle of median eyes wider in front and not as high as wide, a groove below anterior row; clypeus convex and about as high as the quadrangle; mandibles vertical, cone-shaped, fang groove short; labium very narrow, about one-third width of sternum and fused with it; maxillae start near tip of labium, twice as long as wide and reach the mandibles, tips truncate and black; sternum dark brown, triangular, almost as wide as long, extending between IV coxae as a broad lobe, so that coxae are separated by more than a diameter; abdomen very much swollen, two-thirds as wide as long and almost as high as wide, carried beyond the spinnerets, tip truncate and extending as a thick tubercle that projects upward and backwards, a dull brown, with paired lemon-yellow spots from base to tubercle, basal pair fused, sides with yellow elongate spots, tubercle paler with tip truncate and black, venter dull brown, impossible to see openings of spiracle; legs, 1–4–2–3, pale with tips of tarsi and metatarsi darker, last two joints coverd with fine hairs, no spines, tarsal comb on IV tarsus of 6 or 7 bristles; epigynum slightly convex, openings two ovals, separated by a rather wide septum, posterior margin of ovals faintly defined.

Male. Length, 2.0 mm., ceph. 0.8 mm., abd. 1.3 mm.

Cephalothorax bright brown, darker about the depression, five-sixths as wide as long, sides evenly rounded, anterior margin less than half the greatest width, thoracic groove a depression; eyes, anterior row strongly recurved, a.m.e. carried forward on a lobe, largest of the eight, separated by a diameter, posterior row straight, little longer than anterior, p.m.e. larger than p.l.e., separated by less than a diameter and from p.l.e. by more than a diameter, lateral eyes touching; quadrangle of median eyes wider in front and not as high as wide, a deep groove below anterior row; clypeus convex, as high as quadrangle; mandibles cone-shaped, weak, fang groove short; labium, maxillae and sternum same as in female; abdomen much smaller than in female, not extending beyond the spinnerets and the tubercle reduced to a round lobe so that abdomen is much higher at the spinnerets than at the base, yellow spots smaller and more separated but with black spot at tip of lobe as in female, venter pale, fold almost at middle of abdomen; legs same as in female; palpus short but terminal joint large, both patella and tibia very short, cymbium two-thirds as

wide as long, and when in place, the embolus appears as a black circular loop in basal half, starting about the middle, curving downward, and ascending as a slender black tube with tip at end of cymbium supported by the conductor.

♂ ♀ Cuba; Soledad, garden

O. P. Cambridge named the genus *Chrysso* in 1882 with this as the genotype from material collected by Traill on the Amazon. It is separated from *Theridion* by the prolongation of the abdomen, and he compared it to *Conopistha*. Two years later, Keyserling redescribed and figured it in Die Spinnen Amerikas, Theridiidae, 1884, **1**, p. 385, pl. 36, figs. 18, 19. He stated that he had seen specimens from Georgia, Florida, and Brazil. In 1902, F. O. P. Cambridge in the Biol. Centr. Amer., treated this genus as a synonym of *Steatoda*, and figured the palpus and epigynum but gave no description.

The Cuban specimens do not agree perfectly with the figures given by Keyserling and Cambridge. Both figure the epigynum as a plain oval opening, with the upper margin concave. In the Cuban specimens the area is convex, the upper margin is convex and forms a narrow depression above the two ovals. It is not an uncommon species in the garden at Soledad, but has not been found in collections from other places.

Genus Episinus Latreille 1809

Episinus gratiosus spec. nov.

Figure 65

Female. Length, 3.5 mm., ceph. 1.2 mm., abd. 2.5 mm. long, 2.0 mm. wide.

Cephalothorax pale yellow, heavily shaded with brown, rather low, almost as wide as long, thoracic depression deep as a recurved line, anterior radial striae distinct; eyes on a low tubercle and carried forward slightly, anterior row strongly recurved, a.m.e. diurnal, separated by more than a diameter, and from the smaller a.l.e. by about a radius, posterior row a little longer than anterior, slightly recurved, p.m.e. largest of the eight, oval, separated by less than short diameter and from p.l.e. by a radius, lateral eyes almost touching, p.l.e. larger than a.l.e., posterior ones heavily ringed with red; quadrangle of median eyes slightly wider in front and higher than wide; eye area separated from clypeus by a groove; clypeus convex, not as high as quadrangle; mandibles vertical, small and weak, no boss, fang groove

short, lower margin with a row of short black hairs; labium more than twice as wide as long and fused to sternum; maxillae three times longer than labium, slightly inclined, anterior margins straight; sternum shield-shaped, two-thirds as wide as long, tip rounded, IV coxae separated by more than a diameter; abdomen brown, mottled with white, base very narrow; greatest width one-fourth distance from spinnerets, where it is produced in a pair of low, widely separated tubercles, a few scattered spindle-shaped bristles or slender spines at base and on sides, venter pale, spinnerets at end of a small cone continued beyond tip of abdomen, colulus small but distinct; legs, 1–4–2–3, very unequal in length, I pair very long, femora pale at base, dark brown at distal half, tibiae and metatarsi with wide median and distal bands, I femur bent, spindle-shaped spines at tips of patellae and near base of tibiae, IV tarsus with comb of eight curved bristles; epigynum dark brown, with a transverse oval opening at anterior end, followed by a convex area, showing a pair of dark oval sacs beneath the skin.

Holotype ♀ Cuba; Oriente, Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

This species is very near *Episinus putus* Cambridge from Mexico and Panama. It lacks the hairs on the lateral tubercles of the abdomen, and the oval at the base of the epigynum is much smaller. In the description of *Episinus putus* the spindle-shaped spines on the patellae and tibiae are not mentioned. *Meotipa clementina* Petrunkevitch belongs to the same group, but it is smaller and the quadrangle of median eyes is square.

Genus Meotipa Simon 1894.

Meotipa clementina Petrunkevitch

Figures 79, 80

Meotipa clementina Petrunkevitch, 1930, p. 212, figs. 61, 62.

Male. Length, 2.5 mm., ceph. 1.0 mm., abd. 1.5 mm.

Cephalothorax pale, with a reddish-brown median stripe which includes the eye turret and gradually fades at posterior margin, in this stripe in front of the depression are two pairs of pale spots, probably bristle scars, and in a lateral view there are several very long bristles directed forward towards the eye turret, two pairs of reddish spots above the II and II coxae and a narrow marginal dark line, cephalothorax very nearly as wide as long with sides evenly rounded, thoracic

groove a deep depression; eyes distinctly raised above the plane of the cephalothorax on a turret and carried forward, anterior row strongly recurved, a.m.e. diurnal, surrounded by black, largest of the eight, separated by more than a diameter and almost touching a.l.e., posterior row straight, eyes subequal and equidistant, lateral eyes touching, all eyes but a.m.e. surrounded by red; quadrangle of median eyes wider in front and as high as wide; clypeus vertical, as high as quadrangle; mandibles vertical, very weak and small; labium very small and probably fused to sternum; maxillae long, extending slightly beyond mandibles, tips widened with a straight black edge; sternum pale, triangular, slightly convex, extending between IV coxae which are separated by more than a diameter; abdomen has been injured so that it is impossible to trace color pattern, if any, but apparently pale with cream-color blotches, and a pair of dark lateral marks on posterior third, lacking the protuberance found in the female, venter a dull brown, margined with a darker brown stripe; legs, 1–4–2–3, I pair very long, pale, all femora and tibiae with wide dark rings at middle and apex, with fine hairs in lines, spines, patellae, 0, tibiae, dorsal, 1–1, median and distal, metatarsi, 0, metatarsi longer than tibiae, tarsal comb of 5 or 6 small bristles; palpus very long, femur as long as cephalothorax, patella twice as long as tibia and terminal joint as long as patella, cymbium near tip is divided to form a spine-like projection on side opposite to the embolus which protrudes above the palpal organ, bulb much contracted in basal half, embolus arises from near base, follows the contour of the cavity, makes a sharp right angle turn, and ends as a free, very slender tip near the end of the cymbium between the two points, on the tip of the cymbium are two large spines, one parallel to the longest point, and the other projecting at an angle.

Allotype ♂ Cuba; Soledad, April 1936, (Darlington).
2 ♀ Cuba; Soledad, April 1936, (Darlington).
♀ Cuba; Soledad, (Darlington).

The genus was established by Simon for two species, one from India and the other from the Philippines. Petrunkevitch described this species from a female taken with a cocoon from under a leaf at Bayamon, Puerto Rico. Three females and a male have been found at Soledad. The females have very little color, and the eye group is not raised on a turret as in the male; the cephalothorax is not as wide in proportion, but it has the same row of bristles directed forward in the dark stripe from the thoracic depression to the eye area.

Genus Stemmops O.P. Cambridge 1894

Stemmops darlingtoni spec. nov.

Figures 87, 89

Female. Length, 2.1 mm., ceph. 1.0 mm., abd. 1.2 mm.

Cephalothorax pale brown with a narrow black line about margin, oval, slightly wider than long, low and flat, cephalic portion not distinct from thoracic, no thoracic groove, anterior more pointed than posterior margin; eyes closely grouped and surrounded by black, eye area slightly raised, anterior row straight by upper margins, a.m.e. smallest of the eight, separated by less than a radius and almost touching a.l.e., a.l.e. twice diameter of a.m.e., posterior row slightly procurved, so that lateral eyes are touching, p.m.e. largest of the eight, separated by a line and almost touching p.l.e.; lateral eyes subequal; quadrangle of median eyes higher than wide and wider behind; clypeus not quite as high as quadrangle, slightly inclined forward, front margin pointed; mandibles small and vertical, fang small and weak; labium very narrow, suture distinct between sternum; maxillae inclined over labium, broad, tips almost meeting; sternum yellow, triangular, widest between II coxae and ending in an obtuse point between IV coxae, slightly convex, hairy, margins dark, IV coxae separated by more than a diameter; abdomen very dark gray, with many long hairs, each from a corneous pit, oval, three-quarters as wide as long, venter pale gray, outlined by a pair of paler lines from lung slits which converge to spinnerets, colulus very small; legs, 1–4–2–3, moderately long, bright brown, covered with rows of fine hairs, no spines, comb of 7 or 8 stiff bristles on IV tarsus, tarsi little shorter than metatarsi; epigynum a rather large reddish-brown oval area, slightly wider than long, convex, with many short hairs, much darker about lateral margins, at anterior portion beneath the skin a pair of dark ovals separated by less than a radius, openings probably a pair of ovals separated by their short diameter just above the fold.

Holotype ♀ Cuba; Soledad, 1–11 August 1934, (Darlington).

Paratypes 3 ♀ Cuba; Soledad, August 1934, (Darlington).

O.P. Cambridge proposed the genus *Stemmops* for a male from Tabasco. Later F.O.P. Cambridge described the female and a second male. In 1897, Simon described a second species from St. Vincent. *Stemmops darlingtoni* differs from the others in color, and slight differences in the eyes and the epigynum.

Genus Theridion Walckenaer 1805

Theridion atkinsi spec. nov.

Figures 72, 73, 77

Male. Length, 1.5 mm., ceph. 0.7 mm., abd. 1.0 mm.

Cephalothorax pale, clear yellow with a black marginal line and a median black line to thoracic groove, a few long bristles behind eye area; eyes, anterior row slightly recurved, a.m.e. surrounded by black, slightly largest, a diameter apart, a.l.e. surrounded by red, less than one-quarter diameter from a.m.e., posterior row procurved, eyes subequal and equidistant, and surrounded by red, p.m.e. separated by a diameter; quadrangle of median eyes wider in front and as high as wide; clypeus convex, higher than quadrangle, with a pair of low ridges between anterior row of eyes and the margin; mandibles vertical, almost twice as long as clypeus, outer margins parallel, fang weak; labium slightly wider than long, narrowed at tip; maxillae more than twice as long as labium, inclined; sternum pale yellow, slightly convex, triangular, as long as wide, widest between I coxae, IV coxae separated by less than a diameter; abdomen a dull gray with paired irregular pale spots each side of median area, venter gray, epigastric fold posterior to middle; legs same color as cephalothorax, without markings but with many fine hairs and bristles in rows, anterior pairs very long; palpus, tibia little longer than patella, cymbium barrel-shaped, broadly truncate at tip, embolus starting from enlargement near distal end below two black apophyses.

Female. Length, 1.5 mm.

Coloring same as in male but paler, the median dark line and the marginal line very distinct; epigynum very small, a large dark mass near pedicel, openings in a depressed area.

Holytype ♂ Cuba; Soledad, garden, 11 August, 1931, (Worley).

Allotype ♀ Cuba; Soledad, Sabruco, 16 August, 1931, (Banks).

Theridion atkinsi is related to *Theridion defunctum* Petr. from San Lorenzo River, Panama. It differs in the following points: a pair of low ridges on clypeus instead of short horns, the abdominal markings, which in *Theridion defunctum* are described as "a dark basal spot followed by two rows of three dark spots each, and smaller spots in between." The palpi are similar.

Theridion cabriolatum Franganillo

Theridion cabriolatum Franganillo, 1930, p. 12, fig. 4; Bryant, 1936, p. 325, pl. 23, figs. 2, 3; Franganillo, 1936, p. 51, fig. 20.

Female. Length, 4.0 mm., ceph. 1.6 mm., abd. 2.5 mm.

Cephalothorax with a broad black stripe from anterior eye row to posterior margin, a dark marginal stripe, narrow above first coxae, and wide at posterior margin with upper edge very irregular, leaving two irregular pale patches each side, thoracic groove a deep triangular depression; eyes, anterior row recurved, a.m.e. smallest, separated by a diameter and a half and from a.l.e. by a diameter, posterior row straight, eyes subequal, p.m.e. separated by a scant diameter and from p.l.e. by a diameter and a half, lateral eyes touching and surrounded by red; quadrangle of median eyes wider in front and as high as wide; clypeus with a distinct groove below anterior eye row, lower half convex and projecting, as high as quadrangle; mandibles brown, long and attenuate, fang weak; labium almost twice as wide as long, slightly narrower at tip than at base; maxillae three times as long as labium, slightly inclined, outer margins dark; sternum dark, triangular, slightly longer than wide, widest between first coxae, fourth coxae separated by a diameter; abdomen with a small bilobed basal spot, followed by three pairs of widely separated dark spots, connected by diagonal gray lines to a median gray line, a pair of dark spots near apex, sides with diagonal dark spots, venter a broad dark median stripe from pedicel to dark ring around spinnerets, about middle a white rectangular spot; legs much broken, 1–4–2–3, very unequal in length, broad dark rings at tip of femora, tibiae and metatarsi, tarsal comb of 7 long curved bristles; epigynum, a simple circular opening, heavily chitinized on lower margin anterior to fold.

♀ Cuba; Soledad, 9 October, 1926, (Darlington).

♂ 2 ♀ Cuba; Sierra de Cobre, Loma del Gato

♂ Cuba; Trinidad Mountains, Buenos Aires, 2,500– 3,500 feet, 9 May, 1936, (Darlington).

♂ ♀ Cuba; South side of Pico Turquino, June 1936, (Darlington).

♀ Cuba; Mountains North of Imias, 3,000–4,000 feet, July 1936, (Darlington).

Franganillo had twelve females from the Sierra Maestra, and in his last paper he described the male. Both males and females are brilliantly marked with black and yellow as is characteristic of the section *Phyllonethis*. The markings are very close to the figures of *Theridion electum* (O.P. Cambridge).

Theridion floridense Banks

Figure 85

Theridion floridense Banks, 1904, p. 125.
? *Theridion lyra*, Keyserling, 1884, p. 50, pl. 2, fig. 28, *nec lyra* Hentz.

This is a very small species and is evidently very variable in color markings. Keyserling had only a female from Centerville, Florida, (Marx Coll.), he figures the entire spider and the epigynum. The latter is very distinct. Mr. Banks found both males and females at Runnymede and Lake Worth. Our Cuban specimen is smaller than those from Florida but the epigynum is the same.

♀ Cuba; Soledad, Vilches Hill, 18 August, 1931, (Worley).

Theridion fordum Keyserling

Theridion fordum Keyserling, 1884, p. 23, pl. 1, fig. 9.
Tidarren fordum, Chamberlin and Ivie, 1934, no. 4, p. 5, pls. 1, 2.

Until 1934, only the female of this species was known. Then males and females were found together in California, Florida, and Texas. Females were abundant at Barro Colorado, Panama, and the Biol. Centr. Amer., reports it from various parts of Mexico, Central America, and Brazil. Dr. Petrunkevitch found one female in Puerto Rico. The male is very small and only one palpus develops.

♀ Cuba; Soledad, Vilches Cave, August 1931, (Worley).

Theridion globosum Hentz

Theridion globosum Hentz, 1850, p. 278, pl. 9, fig. 23; Emerton, 1882, p. 14, pl. 2, fig. 3.

This small *Theridion* is found from New Hampshire to Florida. It has not been found in Central America or any of the islands of the West Indies.

♀ Cuba; Soledad, Vilches Hill, 18 August, 1931, (Worley).

Theridion rufipes Lucas

Theridion rufipes Lucas, Explor. Algerie, 1847, p. 263, pl. 16, fig. 5.
Steatoda rufipes, F.O.P. Cambridge, Biol. Centr. Amer., 1902, p. 384, pl. 36, figs. 15, 16.

Several males and females of this cosmotropical spider were found at Vilches Cave, Soledad, 14 August, 1931 by Banks and Worley. It was not found by Petrunkevitch in Puerto Rico.

Genus Theridula Emerton 1882

Theridula opulenta (Walckenaer)

Theridion opulentum Walckenaer, 1837, p. 322.
Theridula sphaerula Emerton, 1882, p. 25, pl. 5, fig. 3.
Theridula opulenta, Petrunkevitch, 1930, p. 189, figs. 33–36.

This is a common cosmopolitan species found from Canada to Peru. It varies greatly in size, coloring, the development of the abdominal spines, and has been described and figured under many names. It has been found at Soledad and the Trinidad Mountains.

Sub-family NESTICINAE

Genus Nesticus Thorell 1870

Nesticus antillanus spec. nov.

Figure 90

Male. Length, 2.6 mm., ceph. 1.1 mm. long, 1.0 mm. wide, abd. 1.6 mm.

Cephalothorax smooth and shining, pale yellow with a median dark stripe from p.l.e., narrowed at thoracic groove and continued at about half the greatest width to posterior margin, clypeus dusky, anterior margin narrowed to half the greatest width, rather low and flat, thoracic groove long and very deep; eyes almost cover width of head, anterior row recurved, equidistant, a.m.e. smallest, dark, separated by less than short diameter, posterior row procurved, eyes surrounded by red, p.m.e. oval, slightly larger than p.l.e., separated by a little less than short diameter, and from p.l.e. by less, lateral eyes on a low tubercle, touching, subequal; quadrangle of median eyes narrower in front and higher than wide; clypeus, slightly convex with a faint depression below anterior row, as high as quadrangle; mandibles small and cone-shaped, without boss, fang groove slightly oblique, three teeth on superior margin of groove; labium not quite as long as wide, apparently fused to sternum; maxillae twice as long as labium,

slightly inclined, palpi incerted at basal third; sternum triangular, convex, IV coxae separated by a little less than a diameter; abdomen oval, little more than half as wide as long, base very narrow, a median gray stripe from base to spinnerets, with a black stripe each side that is broken by pale spots, sides with an oblique narrow black stripe, venter pale, epigastric fold black with a large black spot in front of spinnerets, sides and venter with long scattered hairs; legs, I pair and III left missing, very long and slender, many are broken so that it is impossible to count spines on tibia and metatasus, comb of long bristles on IV tarsus; palpus as long as cephalothorax, tibia a little longer than patella with a rounded lobe on dorsal side, paracymbium long and divided, the lower portion large and spoon-shaped with a dark tooth on upper margin, upper portion much longer and very slender with distal half dark and ribbon-like, embolus arises on margin, follows the contour of cavity, and at top makes an abrupt right angle turn ending in a small black tip between two points, between tip and origin of embolus, is a long spatulate process half the length of the cymbium which extends outward at right angles to plane of the palpus, this has quite a large base, and ends in a black curved hook very similar to process in *Nesticus cellulanus*, seen from the opposite side is a dark hook near the base.

Holotype ♂ Cuba; South side of Pico Turquino, June 1936, (Darlington).

This species is much smaller than the genotype but the palpus is very similar. It differs in the divided paracymbium, the slightly inclined maxillae and the deep thoracic groove. In *Nesticus cellulanus*, the genotype, the inner margins of the maxillae are parallel and the thoracic groove is a transverse depression.

Nesticus pallidus Emerton

Nesticus pallidus Emerton, 1875, p. 279, pl. 1, figs. 22–27.
Nesticus suggerens Chamberlin, 1924, p. 15, pl. 4, figs. 29–31.
Theonoe striatipes Petrunkevitch, 1930, p. 167, figs. 29–31.
Centromerus ovigerus ibid., p. 215, figs. 63, 64.

Female. Length, 2.6 mm., ceph. 1.0 mm., abd. 1.7 mm. long, 1.7 mm. wide.

Cephalothorax nearly as wide as long, yellow, clouded about margin, three converging rows of bristles from eyes, meeting at thoracic groove, groove longitudinal about middle of carapace; eyes

anterior row straight, equidistant, a.m.e. smallest of the eight and about half the diameter of a.l.e., posterior row procurved so that lateral ones touch, subequal, p.m.e. separated by more than a diameter and by about a diameter from p.l.e.; quadrangle of median eyes narrower in front, higher than wide; clypeus higher than quadrangle; mandibles vertical, attentuate, longer than clypeus with at least two teeth on superior margin of fang groove; labium twice as broad as long, fused to sternum, tip truncate; maxillae more than twice as long as labium, not inclined, upper margin with a distinct carina; mouth parts and coxae pale; sternum dark gray, triangular, widest between first coxae, truncate at tip, fourth coxae separated by more than a diameter; abdomen as long as wide, sometimes bilobed at base, dark gray with an indistinct pale median line extending almost to spinnerets, with scattered long hairs or bristles, venter dark gray; legs rather short, yellow with many long bristles in rows, no spines; epigynum near pedicel, seen laterally as a distinct swelling.

♀ Cuba; Soledad, grass near laboratory, 1 August, 1931, (Worley).

♀ Cuba; Soledad, April, 1936, (Darlington).

♀ Cuba; Maisi, 15, 16 July, 1936, (Darlington).

♀ Cuba; San Antonio de los Baños, (Aguayo).

This species was described from a male and female found in a cave in Virginia. *Nesticus suggerens* was described from Louisiana and *Theonoe striatipes* and *Centromerus origerus* from Puerto Rico. The types of the first two species are in the Collection of the Museum of Comparative Zoology. The species has been found in New York and Texas, and in a small collection of spiders made by Professor Kincaid during July, 1905 at Bermuda.

The genus *Nesticus* was proposed by Thorell in 1870 for *Aranea cellulana* Clerck and placed between *Theridion* and *Steatoda*. Because it has a comb on the fourth tarsus it has been placed by some students in the *Theridiidae*. It also has a very large paracymbium and so, by others, it is regarded as an aberrant genus in the Argiopidae. Dahl makes a new family for it. That it is aberrant and not stable is shown by the thoracic groove which is a transverse depression in the genotype, a very long and deep groove in *N. antillanus*, and a short groove in *N. pallidus*. It is not surprising therefore, that the species have so often been misplaced. While *Centromerus ovigerus* is described as lacking a comb on the fourth tarsus, the figure of the palpus agrees perfectly with the palpus of *pallidus*. It probably has a very wide distribution, but as it is small and pale it is easily overlooked.

Family LINYPHIIDAE

Sub-family LINYPHIINAE

Genus Linyphiella Banks 1905

Linyphiella coccinea (Hentz)

Linyphia coccinea Hentz, 1850, p. 30, pl. 4, fig. 8.
Frontina coccinea, Keyserling, 1886, p. 100, pl. 14, fig. 188.
Linyphiella coccinea, Banks, 1905, p. 311.
Linyphia humilis Franganillo, 1926, p. 50.
Linyphia vicina Franganillo, ibid., p. 51, (10); ibid., 1936, p. 59.
Frontinella coccinea, Blauvelt, Festschrift Dr. Strand, 1937, p. 149, figs. 96, 100.

This is a common species in the southern United States. Banks reports it from Haiti but Petrunkevitch did not find it in Puerto Rico. Through the kindness of Dr. C. S. Crosby, Franganillo's species have been compared with typical specimens from Florida.

♂ ♀ Cuba; Havana, Banks Coll.
♂ ♀ Cuba; Soledad, August 1931, (Banks and Worley).
♂ ♀ Cuba; Siboney, 1915, (Ferrer).

Sub-family LOPHOCARENINAE

Genus Ceraticelus Simon 1884

Ceraticelus nigripes spec. nov.

Figures 91, 92, 96, 100

Male. Length, 1.5 mm., ceph. 0.7 mm., abd. 0.8 mm.

Cephalothorax bright yellow, eye area darkened and elevated in a bluntly-rounded tubercle, eyes surrounded by black with a few bristles about a.m.e. and two diverging rows of stout bristles best seen in profile from p.m.e. to base of tubercle; anterior row of eyes recurved, a.m.e. smallest, separated by a scant diameter and from a.l.e. by more than two diameters, posterior row slightly procurved, p.m.e. separated by two diameters and from p.l.e. by a diameter and a half, lateral eyes subequal and touching; quadrangle of median eyes narrower in front and as wide as high behind; clypeus slightly convex below a.m.e., then vertical, about twice as high as quadrangle; sternum pale yellow, widest between second coxae, squarely truncate at tip, fourth coxae separated by more than a diameter; abdomen about same color as cephalothorax with dorsal sclerite covering the entire abdomen,

fine hairs very indistinct, from corneous pits, venter, epigastric sclerite faint and inframmillary sclerite very light colored; legs, femora pale yellow, darker at tip, patellae and tibiae almost black, metatarsi and tarsi dark, all joints with rows of fine hairs; palpus, femur pale and slightly curved, patella pale, almost as long as femur, much swollen, so that at middle it is broader than femur, wider at tip than at base, and almost as long as cymbium, tibia short, paracymbium very long, slender and tapering, ending in a sharp point, base broad, dorsal sides of cymbium strongly angulate and ending in a sharp hook, the ridge armed with a row of stiff curved hairs, separate parts of palpal organ difficult to see because of lack of color, but a large black spine (embolus) is visible near the tip.

Female. Length, 1.7 mm.

Female much darker than male, head low and eyes surrounded by black; patellae and tibiae black; dorsal sclerite smaller than on male, both epigastric and inframmamillary sclerites distinct, the latter broad on venter and sides; epigynum two oblique oval openings as figured.

Holotype ♂ Cuba; Soledad, 16 August, 1931, (Banks).

Allotype ♀ Cuba; Soledad, 16 August, 1931, (Banks).

Paratypes ♂ 3 ♀ Cuba; Pico Turquino, 6,000 feet, 16–21 June 1936, (Darlington).

This species differs from others of the genus by the bluntly rounded head of the male, the very long paracymbium, and the enlarged patella of the palpus. In both male and female the patellae and tibiae are conspicuously dark. The male and female from Pico Turquino are very dark but the palpus and epigynum agree with the specimens from Soledad. The male has the paracymbium a little longer, and the angle on the dorsal side of the cymbium, seen in profile, is produced in a tubercle.

Ceraticelus tumidus spec. nov.

Figures 93, 94, 97

Male. Length, 1.5 mm.

Cephalothorax orange-yellow, head elevated, darker about the eyes, much swollen, projects forward, bluntly rounded in front, not divided in lobes; eyes, in rows of equal length so that lateral eyes are touching, anterior row strongly recurved, a.m.e. smallest, separated by a little more than a diameter, posterior row slightly recurved, p.m.e. largest,

separated by more than two diameters and from p.l.e. by a diameter and a half; clypeus retreating, more than twice the eye area, convex below the eyes and then concave; sternum and mouth parts orange; abdomen yellow, paler than cephalothorax; dorsal sclerite almost covers the dorsum, not much darker than dorsum, venter pale, epigastric sclerite distinctly orange-yellow, thicker and darker along furrow, inframammillary sclerite distinct and paler than epigastric; palpus, femur nearly straight, patella short, strongly curved dorsally, tibia short with a small tooth on inner side, paracymbium long, broad with sides parallel and squarely truncate tip, bezel large, slightly constricted about middle and greatly swollen at base, tail-piece of embolic division long and curving.

Holotype ♂ Cuba; Havana, (Cervera).

This species is related to *Ceraticelus similis* (Banks) but it is easily separated by the much broader paracymbium and the heavy bezel. The head is more swollen and projects farther forward.

Sub-family GONATIINAE

Genus Walckenaera Blackwall 1833

Walckenaera vigilax (Blackwall)

Neriene vigilax Blackwall, Ann. Mag. Nat. Hist., 1853, p. 24.
Spiropalpus spiralis Emerton, 1882, p. 39, pl. 10, fig. 6.
Walckenaera vigilax, Crosby and Bishop, 1931, p. 378, figs. 71–75.

This small spider has a wide distribution in Europe and America. It has been found as far west as Laggan, Canada, and south to Florida. Crosby found it in the material collected by airplane at an altitude of 2,000 feet at Tallulah, Louisiana.

♂ Cuba; Havana, Cojimar, 1 May, 1931, (Aguayo).

Sub-family ERIGONINAE

Genus Ceratinopsis Emerton 1882

Ceratinopsis anglicana (Hentz)

Theridion anglicanum Hentz, 1850, p. 275, pl. 9, fig. 6.
Ceratinopsis anglicana, Bishop and Crosby, 1930, p. 15, figs. 1–4.

This small species is found in the southern part of the United States. Bishop and Crosby give a detailed description and figures. They had a female from Cerro Cabras, Cuba.

♂ ♀ Cuba; Havana, (Cervera).

Genus Erigone Audouin 1825

Erigone autumnalis Emerton

Erigone autumnalis Emerton, 1882, p. 58, pl. 17, fig. 8; Crosby and Bishop, 1928, p. 19, figs. 18–20.

This little species has a wide distribution. The types are from Boston, Massachusetts, and New Haven, Connecticut. It has been taken by airplane at Tallulah, Louisiana at an altitude of 2,000 feet, and it has been found in Bermuda, as far south as Florida, and west to Texas.

♂ ♀ Cuba; Soledad, 3 July, 1932, (Bates and Fairchild).

Genus Grammonota Emerton 1882.

Grammonota emertoni spec. nov.

Figure 88

Female. Length, 2.5 mm., ceph. 1.0 mm., abd. 1.5 mm.

Cephalothorax pale yellow, thoracic portion lightly shaded with gray, two-thirds as wide as long, anterior margin slightly narrowed, no thoracic groove; eyes not covering the width of the head, each eye surrounded by black, anterior row recurved, a.m.e. smallest of the eight, separated by a line and from a.l.e. by a diameter; posterior row strongly procurved, p.m.e. slightly larger than p.l.e., separated by less than a diameter and from p.l.e. by a diameter, lateral eyes touching and subequal; quadrangle of median eyes narrower in front and twice as high as wide behind; clypeus not as high as quadrangle and slightly convex; pedipalp without a claw; mandibles slightly swollen at base, fang groove a little oblique, superior margin with four teeth and inferior margin with four smaller teeth, fang long and evenly curved; labium one-half as long as wide, one-third width of sternum, rebordered; maxillae three times as long as labium and slightly inclined; sternum pale yellow, dark gray about margins, wider than long, (4:3), lateral margins emarginate between coxae, carried as a lobe between IV coxae and almost reaching pedicel, only slightly convex,

IV coxae separated by more than a diameter; abdomen broadly oval, (9:11), sparsely clothed with short, fine hairs, with gray markings characteristic of *Grammonota*, a narrow median gray line from base to middle with pale areas each side, posterior half with slightly bent chevrons, sides gray, venter paler, spiracle openings are two widely separated openings anterior to spinnerets; legs pale yellow with rows of fine hairs beneath I and II pairs, some of the hairs are longer but hardly could be called spines; epigynum very near the pedicel, darkened area as wide as high, slightly rounded from plane of abdomen, above the posterior margin a crescent-shaped line heavily chitinized, anterior to this on each side are oblique oval openings with margins heavily chitinized.

Holotype ♀ Cuba; Soledad, 1–11, August 1934, (Darlington).

This species is undoubtedly related to *Grammonota insanus* (Banks), *Acartauchenius insanus*, Proc. Cal. Acad., 1898, **1**, p. 242, pl. 14, fig. 12, and is redescribed and figured by Bishop and Crosby, Journ. N. Y. Ent. Soc., 1932, **40**, p. 398, figs. 14–17. It is known only from the type material collected at San Migel Heracosta, Sonora, Mexico. The female of *emertoni* has a narrower sternum, and in the epigynum, the median lobe is narrower and the openings are above the darkened areas.

Family ULOBORIDAE

Sub-family ULOBORINAE

Genus Uloborus Latreille 1806

Uloborus americana Walckenaer

Uloborus americana Walckenaer, 1837, **2**, p. 229.
Uloborus plumipes Emerton, Trans. Conn. Acad., 1888, **7**, p. 454, pl. 11, fig. 1.

Found from New England south to Florida and Central America. Petrunkevitch did not find it in Puerto Rico. The female is easily distinguished from the other species found in Cuba by the first tibia and metatarsus which have a fringe of hairs; also the epigynum is deeply notched on the posterior margin.

♂ ♀ Cuba; Soledad.

Uloborus geniculatus (Olivier)

Aranea geniculata Olivier, Encycl. Method., 1791, p. 214.
Uloborus geniculatus, Petrunkevitch, 1930, p. 228, figs. 75–76.

This is a cosmotropical species. It has been found in Bermuda, Central America, and most of the islands of the West Indies. Petrunkevitch figures the epigynum and the palpus.

♂ ♀ Cuba; Santiago de las Vegas, Banks Coll.

Uloborus variegatus O. P. Cambridge

Figure 95

Uloborus variegatus O. P. Cambridge, 1898, p. 266, pl. 38, fig. 11; F. O. P. Cambridge, ibid., 1902, p. 362, pl. 34, fig. 8; Petrunkevitch, 1930, p. 229, figs. 77, 78.

Uloborus communis Franganillo, 1926, p. 46.

Male. Length, 3.0 mm., ceph. 1.4 mm., abd. 1.6 mm.

Cephalothorax pale brown with scattered white hairs most numerous about the eyes, four-fifths as wide as long, sides evenly rounded, anterior margin narrow, thoracic groove a Y-shaped depression; eyes, anterior row seen from the front, straight, a.m.e. largest of the eight and carried forward on a lobe, separated by a diameter and a half, other eyes subequal, posterior row slightly recurved, not quite as long as anterior row, p.m.e. little nearer p.l.e. than to each other; quadrangle of median eyes narrower in front and as wide as high; clypeus equals diameter of a.m.e.; mandibles small, vertical, and margins covered by tips of maxillae so that fang groove can not be seen; labium small, longer than wide, tip pointed; maxillae with tips much broadened, truncate with black margins; sternum pale brown, darker about margin, triangular, ending in a blunt point between IV coxae; abdomen twice as long as wide, pale brown, posterior half thickly covered with cream-colored paired spots, basal half high, rounded, and the two pairs of humps found on female can be traced only by paired pale spots, tip much darker and broadly rounded, venter pale, mottled with dark brown, and a pair of diverging pale stripes from the lung slits which disappear on sides near the spinnerets; legs brown, I pair longest, I femur slightly bent and enlarged, I tibia with many short spines on dorsal side, irregularly placed and most numerous near the tip, II, III and IV femora with row of long curved cilii as in the female; palpus short, patella and tibia not as long as wide, each with a very long, stiff bristle on dorsal side; palpus almost globose as figured.

Allotype ♂ Cuba; Soledad, 9 January, 1927, (Brues).

♂ ♀ Cuba; Soledad, January, 1927, (Brues).

Mr. Banks reported *Uloborus republicanus* Simon from Cayamas,

collected by Mr. Schwarz in March, 1905. The latter published an interesting account of the huge web in the Proc. Ent. Soc. Wash., 1904, 6, p. 147–148. It is probably *Uloborus variegatus* Cambridge, as the latter species has been found at Soledad. *Uloborus republicanus* was first found by M. Simon in Venezuela, and an account of the web was published in a short paper on social spiders in the Ann. Soc. Entomol. France, 1891, 60, p. 5–14, pls. 1–4. Later Petrunkevitch found it in Trinidad, and it has since been reported from Barro Colorado, Panama. *Uloborus variegatus* is smaller and darker. Petrunkevitch gives a detailed description of the female in his Porto Rican Spiders. The male is even smaller than the female, the legs are brown, without the wide dark bands as in the female, and the a.m.e. are carried forward on a lobe as in some of the male Argiopidae. It differs from the male of *U. republicanus* by the small size and the a.m.e. Both have the same type of palpus with the circular embolus half hidden by a flattened piece, and ending at the tip of the cymbium as a short black point near the conductor which is also much reduced in size. Franganillo, 1936, states there is great variation in the amount of color, but all specimens in the Museum of Comparative Zoology Collection are very dark.

Genus Miagrammopes Simon 1869

Miagrammopes cubanus Banks

Figure 86

Miagrammopes cubanus Banks, 109, p. 159.

Female. Length, 6.0 mm.

Cephalothorax brown, covered with fine white hairs, almost twice as long as wide, with a lateral protuberance about one-third from anterior margin which carries the lateral eyes, then slightly narrowing, and sides almost parallel to posterior margin; eyes of anterior row wanting, posterior row straight, subequal, median eyes separated by twice the distance between median and lateral; mandibles pale, mouth parts and sternum brown; abdomen yellowish with an indistinct brown basal spear-mark on each side of which is a dark spot covered with fine white hairs, venter mottled, very dark about spinnerets; legs, I pair longest and heaviest, with a heavy brush of dark hairs on prolateral and retrolateral sides of metatarsus, and a ventral row of white hairs on tibia, femur with a basal retrolateral dark spot, prolateral basal and distal dark spots, II and III pairs weak and short, femora with

basal prolateral row of curved cilia, IV metatarsus concave, calamistrum nearly the entire length, and the usual row of short, stiff bristles on ventral side of tarsus and apical third of metatarsus; epigynum as figured.

Holotype ♀ Cuba; Cayamas, (Baker and Schwarz), Banks Coll.
♀ Cuba; Soledad, August, 1936, (Darlington).

The type is probably one or two moults from maturity so that it is impossible to trace all parts of the epigynum. I have not seen *Miagrammopes ciliatus* Petrunkevitch from St. Thomas, Virgin Islands, but from the description and the figures, it differs from the Cuban species in the shape of the epigynum. Franganillo reports *Miagrammopes thwaitesii* Cambridge from the Sierra de Rangel. It came originally from Ceylon.

Miagrammopes latens Bryant

Figure 98

Miagrammopes latens Bryant, 1936, p. 326, pl. 23, fig. 4.

Female. Length, 7.0 mm., ceph. 2.0 mm., abd. 5.0 mm.

Cephalothorax brown, mottled with black, twice as long as wide, dark rings about eyes and lateral eye tubercle black, a circular depression in place of thoracic groove; eyes of anterior row impossible to see even with a high magnification and strong light, eyes of posterior row slightly recurved, and subequal; p.m.e. nearer p.l.e. than to each other; mandibles, labium, maxillae, palpi and sternum pale; sternum poorly defined but lateral margins carried between II and III coxae; abdomen dull yellow with a dark basal spear-mark, four pairs of dark dots on margin, and several unpaired black dots on basal half, an abrupt enlargement anterior to middle, and a large dorsal tubercle over the spinnerets, venter dull yellow with a pair of large dark spots about midway between the fold and the spinnerets; legs very unequal in length; I pair longest, 8.0 mm. long, brown, except for tarsus, no brush of hairs on tibia or metatarsus, no spines, II and III pairs very short, pale yellow, femora with prolateral basal row of curved cilia, IV pair yellow, calamistrum almost entire length of metatarsus, ventral row of spindle-shaped spines on metatarsus and tarsus; epigynum as figured.

Holotype ♂ Cuba; Sierra de Cobre, Loma del Gato, 2,600–3,500 feet, (Bruner).

Allotype ♀ Cuba; Trinidad Mountains, Mina Carlota, 19–25 March, 1925, (Salt and Myers).

Paratype ♀ Cuba; Soledad, August, 1931, (Worley).
Paratype ♀ Cuba; Soledad, April, 1936, (Darlington).
Paratype ♂ Cuba; Pico Turquino, 25 June, 1936, (Darlington).
Paratypes ♂ 3♀ Cuba; South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

This species was described from a male that had most of the spines on the first tibia broken. Most of the specimens seen are immature and there is great variation in the markings; some are dark brown and show no spots, others are pale and have the conspicuous dark spot on the first femur as in *M. cubanus;* in some, the fringe of cilia on the first and second femora have been brushed off and it is difficult to see the scars.

It is possible that this species may prove to be a synonym of *M. cubanus* Banks, as the type of the latter is probably one or two moults from maturity and the markings, rows of cilia and brush on first tibia and metatarsus are characters that are not always easy to find in immature specimens. Petrunkevitch described *M. ciliatus* from St. Thomas, Virgin Islands 1926, and later reported it from Puerto Rico. He states that color pattern is of little value as a specific character, and that because the eyes of the anterior row are so small as to be overlooked, it is a character that can not be used.

Family DEINOPIDAE

Genus Deinopis MacLeay 1839.

Deinopis lamia MacLeay

Figures 99, 101

Deinopis lamia MacLeay, 1839, p. 9, pl. 2, fig. 1; Petrunkevitch, 1930, p. 234, figs. 83–86.

Female. Length, 22.5 mm., ceph. 4.6 mm. long, 3.0 mm. wide, abd. 18.0 mm. long, 3.5 mm. wide.

Cephalothorax brown, mottled with dark spicules on posterior portion, bright red behind p.m.e., flat, no thoracic groove, head narrowed to width of large eyes, lateral margins parallel and posterior margin wider than anterior; mandibles brown, vertical, no boss, fang groove oblique; superior margin with five teeth, inferior margin with five teeth, four nearest base of fang small and unequal, followed by one much larger, fang strong and evenly curved; labium longer than wide, with tip rounded and clear; maxillae at least twice as long as

labium, palpi inserted about middle, distal half much narrowed, inner margin clear, palpus with a conspicuous claw at tip; sternum pale brown, mottled with darker brown, triangular, ending in a sharp point in front of IV coxae, IV coxae contiguous; abdomen brown with a narrow median dark line from base to spinnerets, sides vaguely striped with pale and dark lines of equal width, with scattered short dark spicules, about middle of abdomen, a pair of dorsal swellings ending in a spine directed towards the tip, best seen in a lateral view, venter pale with an indefinite gray stripe from pedicel to spinnerets, cribellum entire, spinnerets at end of abdomen, anterior pair large, cone-shaped, almost touching, median pair much smaller and widely separated, posterior pair contiguous, cone-shaped; legs, 1–2–4–3, very long, I pair,

femur	patella + tibia	metatarsus + tarsus	total
12.0 mm.	11.5 mm.	14.0 mm.	37.5 mm.

I femur pale brown, mottled with a darker brown, a basal, prolateral fringe of long hairs, spines scattered and very short; calamistrum of fine colorless hairs on basal quarter of IV metatarsus; epigynum dark brown, area slightly convex, a simple transverse oval opening above the fold.

Male. Length, 18.0 mm., ceph. 4.0 mm. long, 2.0 mm. wide, abd. 14.0 mm. long, 1.5 mm. wide.

Cephalothorax brown as in female, with a median pale stripe which is forked anteriorly, darker portions with scattered dark spicules; head narrowed to width of large eyes, lateral margins parallel, posterior margin wider than anterior, no thoracic groove; mandibles brown, vertical, fang groove oblique, no teeth on superior margin but a scopular of long hairs, inferior margin with one small tooth; labium same as in female; maxillae twice as long as labium, touch mandibles, palpi inserted about middle, distal half much narrowed and divergent; sternum triangular, brown with a median pale stripe; abdomen with a narrow dark stripe from base to spinnerets, sides with narrow dark and pale stripes, scattered dark spicules, the pair of dorsal swellings found in female missing but represented by a cluster of dark spicules, venter with distinct median dark stripe from pedicel to spinnerets; legs very long and slender, 1–2–4–3, I pair,

femur	patella + tibia	metatarsus + tarsus	total
16.0 mm.	18.0 mm.	25.0 mm.	59.0 mm.

I femur with no basal prolateral fringe of long hairs; palpus about as long as cephalothorax, basal half of femur pale, remainder of palpus brown with scattered white hairs, patella as long as wide, tibia a little

longer, cymbium as wide as long, palpal organ convex, embolus with three concentric circles in center around a square white membrane.

Allotype ♂ Cuba; Coast below Pico Turquino, 30 June, 1936, (Darlington).

♀ Cuba; Coast below Pico Turquino, 30 June, 1936, (Darlington).

♀ Cuba; South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

immat. ♀ Cuba; Soledad.

MacLeay described the species from a specimen probably half grown, as it was only 4½ lines long, (14.0 mm.). In 1930, Petrunkevitch redescribed the female from Desecheo Island in his paper on Porto Rico Spiders. It was 14.0 mm. long but he does not mention the epigynum, and in the description, he fails to mention the pair of dorsal projections of the abdomen. Franganillo has described two more species, both from females, but his descriptions give little more than generic characters. Probably the eyes are the same in all species. Evidently the teeth on the fang groove are a very uncertain character as they are unlike in the male and female. A number of immature specimens have been seen and these lack the dorsal projections of the abdomen.

Family ARGIOPIDAE

Sub-family ARGIOPINAE

Genus Argiope Audouin 1825

Argiope argentata (Fabricius)

Aranea argentata Fabricius, 1775, p. 433.
Gea panamensis Chamberlin, 1916, p. 243, pl. 19, fig. 8.
Argiope argentata, Petrunkevitch, 1930, p. 241, figs. 90–92.

This species is found in the southern part of the United States, Central America, West Indies, and south to Patagonia. Both males and females from all parts of Cuba are common in collections.

Argiope aurantia Lucas

Argiope aurantia Lucas, 1833, **2**, p. 87, pl. 1, fig. 1.
Argiope riparia Emerton, 1884, p. 329, pl. 34, fig. 19, pl. 38, figs. 13, 14, 19.
Miranda cophinaria F.O.P. Cambridge, 1903, p. 452, pl. 43, figs. 4, 5.

This is a common species in the United States, Mexico and Guatemala. Petrunkevitch did not find it in Puerto Rico, and it has not been reported by Franganillo.

♀ Cuba; Havana.

Argiope trifasciata (Forskål)

Aranea trifasciata Forskål, Descript. Anim., 1775, p. 86, Petrunkevitch, 1930, p. 239, figs. 87–89.

A common species from Canada to Chili. It is common in collections from all parts of Cuba.

Genus Gea C. Koch 1843

Gea heptagon (Hentz)

Epeira heptagon Hentz, 1850, p. 20, pl. 3, figs. 5, 6; Petrunkevitch, 1930, p. 243, figs. 93–96.

This species is found in the southern United States and south to Brazil.

♂ ♀ Cuba; Soledad.

♀ Cuba; Havana, Banks Coll.

Sub-family ARANEINAE

Genus Aranea Linnaeus 1758

Aranea faxoni spec. nov.

Figures 102, 103

Female. Length, 2.5 mm., abd. 1.6 mm. long, 1.6 mm. wide, I leg 3.0 mm. long.

Cephalothorax pale yellow without markings; eyes, anterior row recurved, equidistant, a.m.e. slightly largest of the eight, separated by about a diameter and a half, a.l.e. about half the diameter of a.m.e., posterior row straight, and equidistant, p.m.e. separated by a little more than a diameter, lateral eyes touching, p.l.e. slightly larger than a.l.e.; quadrangle of median eyes wider in front; clypeus equals about diameter of a.m.e.; mandibles pale yellow, superior margin of fang groove with three subequal teeth, inferior margin with two teeth; sternum colorless, triangular; abdomen yellow-white without mark-

ings, about as wide as long, with slight shoulder humps that project upwards rather than laterally, the four muscle spots show faintly, venter almost covered with a rectangular white spot, followed by a pair of widely separated white spots anterior to the spinnerets; legs rather short, pale without markings, spines few and colorless; epigynum wider than long, median septum very broad posteriorly and openings widely separated.

Holotype ♀ Cuba; Siboney, (Ferrer).

But one other minute *Aranea* has been described from Cuba, *Epeira gundlachi* Banks. This is very small but the description does not mention any shoulder humps, and the abdomen is one and a half times as long as broad; also the figure of the epigynum is very different. *Aranea faxoni* belongs to the group of small, angulate spiders of which *Aranea miniata* (Walck.) is the most common in the United States. It is named in honor of the late Dr. Walter Faxon, a former curator at the Museum of Comparative Zoology who showed great interest in my early studies of spiders.

Aranea pegnia (Walckenaer)

Epeira pegnia Walckenaer, 1837, **2**, p. 80.
Epeira globosa Keyserling, 1865, p. 820, pl. 18, figs. 19, 20.
Epeira triaranea Emerton, 1884, p. 315, p. 34, fig. 9, pl. 36, fig. 6.

This small species is found all over the United States and in Costa Rica. Petrunkevitch did not find it in Puerto Rico and Franganillo has not reported it from Cuba.

♂ ♀ Cuba; Soledad, garden, July, August 1931, (Worley).
♂ ♀ Cuba; Soledad, San Jose, August 1931, (Worley).

Genus Cyclosa Menge 1866

Cyclosa brevis spec. nov.

Figure 110

Male. Length, 2.3 mm., ceph. 1.0 mm., abd. 1.2 mm.

Cephalothorax dark brown, a little paler about the eye area; eyes, anterior row strongly recurved, a.m.e. carried forward on a lobe, largest of the eight, separated by more than a diameter, posterior row slightly recurved, subequal, p.m.e. separated by a radius, lateral eyes subequal and touching; sternum dark brown; abdomen almost

round, not prolonged beyond the spinnerets, and with indications of three slight tubercles at the tip, pale brown with irregular black dots, and a pair of widely separated white spots surrounded by red at basal third, venter black with the usual pair of widely separated white spots midway between fold and spinnerets; legs yellow with a broad brown band at apical half of femora I and II, and at tips of patellae and tibiae, femora III and IV dark brown at apex and broken dark bands at about middle, spines, I femur, dorsal, row of 4 colorless spines at apical half, prolateral, 1, ventral, 0, patella, dorsal, 1 at tip, retrolateral, 1, tibia, dorsal, 0, prolateral, 3, retrolateral, 0, ventral, 0, II femur, dorsal, 1 colorless spine at tip, ventral, 0, patella, dorsal, 1 at tip, retrolateral, 1, tibia, prolateral, 2, ventral, 0, no spines beneath on III and IV femora, hook on coxa I, coxae III and IV not modified; palpus, 1 spine at tip of patella, tibia little longer than patella, with a large lobe on ventral side, paracymbium small, embolus ending in a long and slender free tip, conductor with a long, heavy spindle-shaped black point at end, clavis broad, and ending in a small black point.

Holotype ♂ Cuba; Soledad, garden, August, 1931 (Banks).

This male *Cyclosa* differs from others described as follows: in the few spines on the legs, especially in the lack of ventral spines on the II tibia; in the very long conductor, and tip of the embolus of the palpus.

Cyclosa caroli (Hentz)

Figure 114

Epeira caroli Hentz, 1850, p. 24, pl. 3, fig. 15.
Cyclosa caroli, Petrunkevitch, 1930, p. 316, figs. 190–191.
Cyclosa elongata Franganillo, 1930, p. 24.

This is the common species of *Cylosa* in the southern part of the United States, replacing *Cyclosa conica* (Pallas), the European species, that is common as far south as New York. It is found in Central America and many of the islands of the West Indies. Petrunkevitch found it in Puerto Rico but he figures the epigynum of an immature specimen.

♀ Cuba; Havana.

♀ Cuba; Trinidad Mountains, March, 1925 (Salt).

Cyclosa oculata (Walckenaer)

Aranea oculata Walckenaer, 1802, p. 428.
Turckheimia walckenaerii O. P. Cambridge, Biol. Centr. Amer., 1899, p. 47, pl. 8, fig. 6.
Cyclosa walckenaeri, F.O.P. Cambridge, ibid., 1904, **2**, p. 495, pl. 47, fig. 9; Petrunkevitch, 1930, p. 315, figs. 188-189.

Through the kindness of Drs. Berland and Fage of the Paris Museum, a male of *Cyclosa oculata* from San Domingo in the Simon Collection was compared with specimens from Cuba, Florida, and Mexico, and was found to be identical. It is suggested in "Les Arachnidés de France," 1929, **6**, p. 760, that the species was introduced in France. It is very common in the garden at Soledad.

♂ ♀ Cuba; Sandiago de las Vegas, Banks Coll.
♂ ♀ Cuba; Soledad, garden.
♀ Cuba; Banes, February, 1893, Banks Coll.

Genus Drexelia McCook 1893

Drexelia directa (Hentz)

Epeira directa Hentz, 1847, **5**, p. 478, pl. 31, fig. 21.
Drexelia directa, F.O.P. Cambridge, 1903, p. 461, pl. 43, figs. 12, 13.

A common species in the southern states and Central America. Petrunkevitch did not find it in Puerto Rico.

♂ Cuba; Havana, (Baker), Banks Coll.
♂ ♀ Cuba; Soledad, garden, July, August, 1931 (Banks and Worley).

Genus Edricus O.P. Cambridge 1890

Edricus crassicauda (Keyserling)

Epeira crassicauda Keyserling, 1865, p. 806, pl. 18, figs. 3, 4.
Edricus crassicauda, Petrunkevitch, 1930, p. 318, figs. 192, 193.

Originally from Colombia, this species has since been found in Panama, Guatemala, Mexico, and Puerto Rico. Females have been seen from Sierra del Cobre, Los Llanos, and Pico Turquino. Franganillo has distinguished three varieties.

Genus Eriophora Simon 1864

Eriophora balaustina (McCook)

Epeira balustina McCook, 1888, p. 198; id., 1893, p. 155, pl. 4, fig. 2.

Eriophora balaustina was described from Florida, and Cuban specimens agree. The abdominal markings vary greatly from the usual type of folium to a slender cross of yellow on a black dorsum. Undoubtedly Franganillo described it more than once, for when the long slender scape of the epigynum is broken, as often happens, the epigynum shows characters not usually seen. Immature specimens have a median row of round blisters, or bosses, on the posterior half of the dorsum which disappear before the last moult. The species of *Eriophora* have never been separated satisfactorily. Petrunkevitch, in his recent paper on the Spiders of Puerto Rico, considers *Eriophora balaustina* a synonym of *Eriophora edax* (Blackwell), first described from Rio de Janeiro, Brazil. Probably the genus will be separated on the secondary sexual characters. All the specimens seen from Cuba agree with F.O.P. Cambridge's description of *Eriophora purpurescens* (O.P. Cambr.) which probably is a synonym of *E. balaustina,* and not *E. edax.*

♂ ♀ Cuba; Havana.
♂ ♀ Cuba; Soledad.

Genus Eustala Simon 1895

Eustala anastera (Walckenaer)

Epeira anastera Walckenaer, 1837, **2**, p. 33.
Epeira prompta Hentz, 1847, p. 473, pl. 31, fig. 4.
Epeira parvula Keyserling, 1863, p. 131, pl. 6, figs. 9, 10.
Eustala anastera, Petrunkevitch, 1930, p. 331, fig. 215.

A common species in all parts of the United States, Mexico, and Central America. It occurs in the Galapagos Islands and most of the islands of the West Indies. It is abundant from all parts of Cuba in collections.

Eustala fuscovittata (Keyserling)

Epeira fuscovittata Keyserling, 1863, p. 129, pl. 6, figs. 7, 8.
Cyclosa thorelli McCook, 1893, p. 228, pl. 19, fig. 11.
Eustala caudata Banks, 1898, p. 255, pl. 15, fig. 5.
Eustala fuscovittata, Petrunkevitch, 1930, p. 332, figs. 216–220.

A common spider in Central America, South America, and the West Indies. It is very abundant in all collections from Cuba.

Eustala uncicurva Franganillo

Eustala uncicurva Franganillo, 1936, p. 80.

This species is compared with *Eustala anastera* (Walck.) and was found in the Sierra Maestra. A small female was taken on the coast below Pico Turquino, and agrees quite well with the description of the epigynum but the markings on the dorsum have faded.

Eustala unimaculatum Franganillo

Eustala unimaculatum Franganillo, 1930, p. 22; ibid. 1936, p. 79; Bryant, 1936, p. 327, pl. 23, figs. 1, 5.

This small *Eustala* has been taken only in the eastern part of Cuba. Both epigynum and palpus are very distinct.

Genus Marxia McCook 1893.

Marxia stellata (Walckenaer)

Epeira stellata Walckenaer, 1805, p. 65, fig. 54; Hentz, 1850, p. 22, pl. 3, fig. 12.

A common species in the United States and Mexico. Petrunkevitch did not find it in Puerto Rico.

♀ Cuba; Santiago de Cuba, Banks Coll.

Genus Metazygia F.O.P. Cambridge 1904.

Metazygia albonigra (Franganillo)

Figures 107–109, 111

Larinia albonigra Franganillo, 1931, p. 44; id., 1934, p. 158; id., 1936, p. 81, fig. 38.

Metazygia wittfeldae Banks, *nec* McCook, 1909, p. 162.

Female. Length, 5.0 mm., ceph. 2.0 mm., abd. 3.1 mm.

Cephalothorax pale brown, head narrowed, no thoracic groove but a depression, median gray stripe from p.m.e. to depression, a long bristle behind lateral eyes, carapace only slightly convex; eyes seen from above, anterior row recurved, equidistant, a.m.e. largest of the eight, separated by less than a diameter, posterior row straight, same length as anterior, p.m.e. almost touching and slightly larger than p.l.e., lateral eyes almost touching and on a small tubercle; quadrangle of median eyes narrower behind and higher than wide; clypeus less than radius of a.m.e. below a.m.e.; mandibles with three teeth on each margin of fang groove; labium wider than long, (3.5: 3.0); abdomen oval, flattened, yellowish, with a black basal spot each side of the median line, sides brownish, four pairs of small black spots on dorsum, venter brownish; legs rather short, 1–2–4–3, same color as cephalothorax, spines, I pair, femur, 3 strong prolateral on distal third, 4 dorsal on distal third, patella, prolateral, 2, retrolateral, 1, dorsal, 1 at tip, tibia, dorsal, 0, prolateral, 3, retrolateral, 2, ventral, 3–4; epigynum about twice as wide as long, a semi-transparent rectangular plate, slightly wider at posterior than at anterior margin, with a very slender, colorless median scape that starts at anterior margin, and the free end does not reach posterior margin, best seen in a lateral view, each side is a dark ear-shaped lobe with oval openings near anterior end.

Male. Length, 3.4 mm., ceph. 2.0 mm., abd. 2.0 mm.

Coloring and markings the same as in female but darker; abdomen with five pairs of converging dark spots on dorsum; legs, I coxae with a small hook on anterior margin and a small tubercle at base; no ventral spines on femora, II tibia not modified, short lateral spine about middle, and a very long ventral spine opposite; palpus short, patella with 1 long dorsal spine, tibia no longer than patella but with a large truncate ventral lobe bearing several long hairs, embolus long with end recurved, and resting under a truncate white disc divided in two unequal lobes with blackened margins, clavis large.

♂ Cuba; Ciénaga de Zapata, Central Covadonga, 16 September, 1936, (Davenport).

♀ Cuba; San Antonio de los Baños, 1915, (Barbour and Brooks).

♂ ♀ Cuba; Soledad, garden, August, 1931, (Worley)

♀ Cuba; Soledad, February, 1925, (Salt and Myers)

♀ Cuba; Havana, (Baker), Banks Coll.

The genus *Metazygia* was proposed by F.O.P. Cambridge in 1904 for two species, *Epeira wittfeldae* McCook, designated as type, and

Epeira gregalis O.P. Cambridge. Both are much larger than this species, but according to the key for genera for Araneinae, Biol. Centr. Amer., **2**, p. 454, this species belongs in *Metazygia*. The male palpus has the curved embolus as in the genotype, but the tip is hidden under the large white piece that is divided in two unequal lobes. The female has the scapes of the epigynum turned downward as in *Cyclosa*, in both *wittfeldae* and *gregalis* it is turned back as in *Eustala*. It can not be placed in *Larinia*, as the patella of the palpus has but one spine, and there is a hook on the first coxae.

It is a common species during August in the garden at Soledad, and has been found by Franganillo at the Sierra de Rangel. He has probably confused it with *Aranea incerta* (O.P. Cambr.) and *A. pallida* Keys., both left in the genus *Aranea* by F.O.P. Cambridge in his revision. These are larger, and differ in the palpus and the epigynum.

Genus Metepeira F.O.P. Cambridge 1903

Metepeira labyrinthia (Hentz)

Epeira labyrinthia Hentz, 1847, p. 471, pl. 31, fig. 3.
Mangora triangularis Franganillo, 1930, p. 21.
Metepeira labyrinthia, Petrunkevitch, 1930, p. 319, figs. 194–196; Franganillo 1936, p. 75.

A common species from Labrador to Patagonia. It has been reported from most of the islands of the West Indies, and Franganillo has it from several localities in Cuba.

♂ ♀ Cuba; Havana, Banks Coll.

Genus Neoscona Simon 1864

Neoscona arabesca (Walckenaer)

Epeira arabesca Walckenaer, 1837, **2**, p. 74.
Epeira trivittata Keyserling, 1863, p. 95, pl. 5, fig. 6–9; Emerton, 1884, p. 311, pl. 33, fig. 16, pl. 36, figs. 2, 3, 5, 6.

A common spider from Labrador to Mexico. It was not found by Petrunkevitch in Puerto Rico.

♂ ♀ Cuba; Soledad, garden, August, 1931, (Worley).

Neoscona minima F.O.P. Cambridge

Neocoscona minima F.O.P. Cambridge, 1904, p. 471, pl. 44, figs. 11, 12.

This Central American species has been found at Soledad in the garden.

♂ ♀ Cuba; Soledad, garden, February, 1925, (Salt and Myers).
♂ ♀ Cuba; Soledad, July and August, 1931, (Worley).
♂ ♀ Cuba; Soledad, April, 1936, (Darlington).

Neoscona oaxacensis (Keyserling)

Epeira oaxacensis Keyserling, Sitz. Ber. Isis, 1863, p. 121, pl. 5, figs. 12–16.
Neoscona oaxacensis, Petrunkevitch, 1930, p. 322, figs. 200–204.

A common species in Mexico, Central America, and Panama. Simon found it in St. Vincent and Petrunkevitch in Puerto Rico.

♂ ♀ Cuba; Havana; Santiago de las Vegas, Banks Coll.
♂ ♀ Cuba; Soledad.
♂ ♀ Cuba; Camaguey, 15 October, 1935, (Acuña).

Neoscona vulgaris (Hentz)

Epeira vulgaris Hentz, 1847, p. 469, pl. 30, fig. 6.
Epeira volucripes Keyserling, 1884, p. 528, pl. 13, fig. 27.
Neoscona volucripes, F.O.P. Cambridge, 1904, p. 473, pl. 44, fig. 18.
Neoscona nautica, Petrunkevitch, 1930, p. 320, figs. 197–199.

This species was described from the southern part of the United States, and has been wrongly identified with a more northern one. Keyserling's species is from Haiti, and the type is in the Museum of Comparative Zoology Collection. It is identical with specimens from Cuba. Cambridge found it common in collections from various parts of Central America and Mexico. I very greatly doubt if the form found by Petrunkevitch in Puerto Rico is really *Neoscona nautica* (Koch) of Egypt and Abyssinia.

♀ Cuba; Aguada de Pasajeros, 3 January, 1913, (Wheeler).
♂ ♀ Cuba; Santiago de las Vegas, (Horne and Houser), Banks Coll.
♀ Cuba; Bolondron, 1913, (Barbour and Shaw).

Genus Parawixia F.O.P. Cambridge 1903.

Parawixia cambridgei spec. nov.

Figures 104–106

Female. Length, 13.0 mm., ceph. 4.5 mm., abd. 9.0 mm. long, 8.0 mm. wide, 6.5 mm. high.

Cephalothorax deep yellow, cephalic area sharply marked by black

lines which, however, do not meet at thoracic groove, covered with short white hairs and longer black bristles that are most numerous about the eyes, anterior margin broad, directly posterior to the lateral eyes are two low round tubercles, outer margins of cephalothorax with cress of long white hairs; eyes in three groups; median eyes form a quadrangle wider in front and as high as wide, a.m.e. separated by about a diameter and a half, p.m.e. which are slightly smaller than a.m.e., are separated by a diameter, lateral eyes on a common tubercle, both eyes directed laterally, and separated by half a diameter; clypeus equals diameter of a.m.e.; mandibles yellow, very dark about fang groove, covered with short white hairs, superior and inferior margins with three teeth; labium dark, rebordered with white, wider than long; sternum dark brown mottled with yellow, triangular, slightly longer than wide, IV coxae separated by less than a diameter; abdomen much extended and probably faded as it shows no color pattern, and has numerous small paired scars, fourteen short tubercles, each with a corneous tip, four lateral pairs, four at tip, and two median above the spinnerets, venter with a dark gray center, enclosing two pairs of pale spots, thickly covered with white hairs; legs pale, each joint with two irregular dark bands and dark spots, spines, anterior femora with two irregular ventral rows of short spines, patellae, dorsal, 1 at tip, 1 at base, 1 pair lateral, I tibia, flattened dorsally, dorsal and lateral spines irregular; epigynum a long slender scape, abruptly narrowed near tip with basal parts fused.

Male. Length, 9.0 mm., ceph. 4.5 mm., abd. 4.6 mm. long, 3.5 mm. wide.

Cephalothorax greenish-yellow, portion posterior to eyes reddish, posterior half quite green, irregular dark lines mark division of cephalic portion from thoracic, followed by a pair of widely separated dark spots, thoracic groove dark, entire carapace covered with short white hairs, with no indications of the round swellings found in the female, and low and flat; eyes in three groups, each carried forward on a distinct tubercle, quadrangle of median eyes narrower behind and wider than high, a.m.e. larger than p.m.e., a.m.e. separated by a full diameter, p.m.e. by a diameter, lateral eyes on a distinct tubercle projecting forward; I coxae with a hook and a basal lobe, trochanter with a sharp spine on posterior margin; abdomen brownish with irregular paired dark lines and scars, covered with short soft white hairs and longer dark bristles, only three pairs of lateral tubercles can be traced by the corneous tips, the four posterior tubercles are distinct and give the abdomen a truncate tip, the two median tubercles

between the posterior tubercles, and the spinnerets can be traced by the corneous tips, the anterior lateral pair found in the female are missing, venter, dark gray enclosing two pairs of dark spots; legs, 1–2–4–3, pale, each joint with median and apical dark band; I pair much the longest, anterior tibiae and metatarsi bent, spines, I femur, ventral, 2 rows, 7 or 8 prolateral, 6 or 7 retrolateral, patella, lateral, 2–2, tibia, ventral, 6 in series, II femur, ventral, row of 10 long, strong, erect spines, tibia incrassate, with two rows of ventral spines, prolateral, 6, stout and specialized, retrolateral, 5, much more slender than those on opposite side, metatarsus much bent with a few small spines at tip, III femur, ventral, 4 erect short spines, IV femur 6 short spines; palpus, 1 long spine at tip of patella, tip of cymbium truncate, tibia produced in a ventral lobe the length of the joint, paracymbium unevenly bilobed, upper portion small and pale, lower dark, broadly spatulate with tip rolled over towards upper side of cymbium, clavis long, tip widened and tri-lobed, base prolonged in a distinct angle.

Holotype ♀ Cuba; Oriente, coast below Pico Turquino, June, 1936, (Darlington).

Allotype ♂ Cuba; Oriente, coast below Pico Turquino, June, 1936, (Darlington).

This species is named in honor of F.O.P. Cambridge who described the genus. It varies in minor details from the type species. In the female, the cephalothorax has two low tubercles posterior to the eye area instead of being flat and low; the upper margin of the fang groove has three teeth instead of four, and there are a greater number of tubercles on the abdomen than in the species found in Central America. The male palpus differs in the very long tri-lobed clavis.

Genus Scoloderus Simon 1887

Scoloderus tuberculifer (O.P. Cambridge)

Carepalxis tuberculifer O.P. Cambridge, 1899, p. 48, pl. 4, fig. 9.
Scoloderus tuberculifer, F.O.P. Cambridge, 1904, p. 521.

Originally described from Panama, this species has been found in Guatamala and Florida.

♂ Cuba; Havana, (Cervera).

Genus Singa C. Koch 1837

Singa cubana Banks

Singa cubana Banks, 1909, p. 162.

Female. Length, 3.1 mm., ceph. 1.4 mm., abd. 2.0 mm. long, 2.1 mm. wide.

Cephalothorax bright yellow-brown, black about eye area; eyes, anterior row recurved, a.m.e. smallest of the eight and carried forward, eyes separated by more than a diameter, and from a.l.e. by fully two diameters, posterior row, straight, p.m.e. largest of the eight, separated by a scant diameter, and from p.l.e. by more than two diameters, lateral eyes on a tubercle and touching; quadrangle of median eyes same width in front as behind and higher than wide; clypeus equals diameter of a.m.e.; maxillae pale brown with a dark spot near the base; labium dark; sternum triangular, brown, shading to black near apex; abdomen as wide as long, dull brown with a pair of dark spots near extreme edge of basal third, muscle spots indistinct, a few scattered irregular white spots on sides, venter with an elongate black spot that encloses the spinnerets; legs yellow, patellae and tibiae slightly darkened, dark spots on ventral tips of coxae and trochanters; spines, I pair, 1 long prolateral spine, and a prolateral row of stiff bristles on tibia and metatarsus; epigynum with a very broad median septum as figured, openings at base.

Holotype ♀ Cuba; Havana, Banks Coll.

In the original description, Banks compares *Singa cubana* with *Singa nigripes* Keyserling. The structure of the epigynum shows that it belongs to another section of the genus and is closely related to *Singa variabilis* Emerton.

Genus Verrucosa McCook 1888

Verrucosa arenata (Walckenaer)

Epeira arenata Walckenaer, 1837, **2**, p. 133.
Epeira verrucosa Hentz, 1850, p. 19, pl. 3, fig. 2.
Mahadeva reticulata O.P. Cambridge, 1889, p. 54, pl. 3, fig. 10.
Verrucosa arenata, Petrunkevitch, 1930, p. 129, figs. 211, 212.

This species has been found from Long Island, New York, south through Central America to Panama. In the West Indies it has been reported from Puerto Rico and San Domingo. It is not impossible that more than one of Franganillo's species are synonyms.

♀ Cuba; Bueycito, 1913, (Barbour).

♂ ♀ Cuba; Soledad, Trinidad Mountains, May, 1936, (Darlington).

Genus Wagneriana F.O.P. Cambridge 1903

Wagneriana tauricornis (O.P. Cambridge)

Epeira tauricornis O.P. Cambridge, 1889, p. 44, pl. 6, figs. 2, 3, pl. 8, fig. 2.
Wagneriana tauricornis, F.O.P. Cambridge, 1904, p. 498, pl. 47, figs. 14, 15.

This is a common species in Mexico and Central America. It has been found in Florida and Louisiana. Petrunkevitch did not find it in Puerto Rico.

♀ Cuba; Santiago de las Vegas, Banks Coll.

Wagneriana undecimtuberculata (Keyserling)

Epeira undecimtuberculata Keyserling, 1865, p. 805, pl. 18, figs. 1, 2.
Wagneriana undecimtuberculata, F.O.P. Cambridge, 1904, p. 489, pl. 47, figs. 17, 18.

This species is found in Central America, Mexico, and Florida.

immat. ♂ Cuba; Santiago de las Vegas, Banks Coll.

Genus Wixia O.P. Cambridge 1882.

Wixia incerta Bryant

Wixia incerta Bryant, 1936, p. 328, pl. 23, figs. 6, 8.

The type, a female, was found at the Sierra del Cobre. Other specimens have been found since, but all from the eastern part of the island.

Holotype ♀ Cuba; Sierra del Cobre, Loma del Gato, 2,600–3,325 feet, (Bruner).

♀ Cuba; Sierra del Gato, 3,000–3,800 feet, 3–7 July, (Darlington).

♀ Cuba; South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

♀ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Wixia nigriventris Bryant

Figure 113

Wixia nigriventris Bryant, 1936, p. 329, pl. 23, fig. 10.

Male. Length, 5.2 mm., ceph. 2.5 mm. long, 2.0 mm. wide, abd. 3.0 mm.

Cephalothorax chestnut-brown, finely granulate, rather flat, thoracic groove long, anterior margin much narrowed; eyes carried forward on a lobe, a.m.e. larger than p.m.e., lateral eyes touching; quadrangle of median eyes narrower behind and wider than high; clypeus very narrow and retreating; mandibles small; labium fused to sternum, slightly wider than long, tip rounded and rebordered; maxillae twice as long as labium, sides parallel; sternum light brown, little more than two-thirds as wide as long, widest between II coxae, slightly notched between I coxae a little before the middle is a dark forward projecting lobe, raised from the plane of the sternum, and a similar but smaller lobe in front of IV coxae, I coxae with a hook, IV coxae with a strong, stout spine, IV trochanters with a similar spine; abdomen triangular, with a pair of short, sharp tubercles near base between shoulder angles, tip of abdomen evenly rounded, basal half covered with fine hairs and scattered dark bristles, venter black between fold and spinnerets; legs, III right missing, 1–2–4–3; anterior pairs much longer than posterior, anterior pairs greenish-brown, I femur slightly enlarged, spines, I femur, dorsal, long, scattered slender spines, patella, lateral, 2–2, distal, 1, tibia, dorsal, 2 near tip, prolateral, 7–8, longer than diameter of the joint, ventral, 2–2–1, and 1 strong spine at tip, metatarsus, prolateral, 5, ventral, 3–4, not in series, II femur slightly enlarged, dorsal scattered spines, ventral, 1–1–1, on basal half surrounded by fine white hairs, patella, lateral, 1–1, 1 at apex, tibia, curved and flattened dorsally, basally incrassate, prolateral, 7 short spines, ventral, 4 prolateral at basal half, first long and slender, others heavy and graduated with curved tips, retrolateral, at base 3 heavy spines, at tip prolateral, a short, stout, curved spine, retrolateral, 2, metatarsus shorter than tibia with scattered ventral and lateral spines, IV femur, dorsal, 1 submedian spine, very long and slender, 3 at tip, ventral, 7 short spines in series on basal third, 1–1, near distal end, 3 graduated retrolateral near distal end; palpus shorter than cephalothorax, patella with 1 long spine; tibia short with a large ventral lobe; clavis very prominent, protruding, and deeply bifurcate.

Allotype ♂ Cuba; Oriente, Sierra de Cobre, 3,000–3,800 feet, 3–7 July, 1936, (Darlington).

The genus was based on a female with a very long basal tubercle that extends over the cephalothorax. The figure shows a very high clypeus, more than twice as high as the quadrangle of median eyes. In this Cuban species, the clypeus is very low, both in the female which is immature and in the male which is adult. Both, however,

have the double row of spines on the anterior tibiae, and in the male, the II tibia is basally incrassate with specialized spines and also has spines on the IV coxae and trochanters. The only two known males of this genus are from Central America. The two median lobes on the sternum are very unusual.

Sub-family METINAE

Genus Azilia Keyserling 1881

Azilia montana spec. nov.

Figures 112, 115

Female. Length, 6.5 mm., ceph. 2.4 mm., abd. 4.6 mm. long, 3.2 mm. wide.

Cephalothorax with a median halberd-shaped dark stripe from posterior eye row to margin, lateral margins dark with markings much heavier posteriorly, cephalic portion moderately high, anterior margin little more than half the greatest width, a few bristles about the margin and between the eyes, thoracic groove short, followed by a deep depression; eyes cover more than three-quarters the width of the head, rows widely separated, anterior row recurved, a.m.e. smaller than a.l.e., slightly nearer a.l.e. than to each other, posterior row a little longer than anterior row, strongly recurved, p.m.e. largest of the eight, separated by a diameter and a half, and from p.l.e. by a diameter, lateral eyes on distinct tubercles and widely separated; quadrangle of median eyes narrower in front and higher than wide; clypeus below a.m.e. about equals the diameter of a.m.e.; mandibles brown, veined with a darker brown, swollen, a distinct basal boss, and a pair of long bristles on inner margin that cross, superior margin of fang groove with three large teeth, inferior margin with three very small teeth; labium brown, wider than long, tip rebordered; maxillae brown, nearly three times as long as labium, sides almost parallel; sternum brown, covered with long, dark hairs, triangular, as long as wide, IV coxae almost touching; abdomen oval, extending over cephalothorax, quite high at base and pointed above spinnerets, a narrow pale median line which extends beyond the middle with two pairs of lateral branches, on each side are irregular blotches of red, broken by black, like an indistinct folium, sides gray, venter with a broad reddish-brown stripe from fold to spinnerets, colulus present; legs, 1–2–4–3, long, femora and tibiae with basal and median pale bands, ventral side of femora pale with,

dark spots, spines, I pair, femur, prolateral, 5, patella, 0, tibia, dorsal, 1 at base, prolateral, 5, metatarsus, dorsal, 1–1, near base, all spines very slender and inconspicuous, all joints covered with fine hairs and bristles; epigynum a deep red-brown plate, wider than long, with posterior margins heavily chitinized, at anterior end are two black depressions, separated by more than a diameter and a half, these are probably the openings.

Holotype ♀ Cuba; Oriente, South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

The genus is easily separated from others of the family by the widely separated eye rows. O.P. Cambridge describes two species from Central America, both slightly larger than *Azilia montana*. The smaller, *Azilia affinis*, has similar markings on the cephalothorax and abdomen, but the venter has a distinct pale band, and from the figure of the epigynum, it may not be adult. The markings on the cephalothorax and abdomen may be generic.

Genus Lucarachne gen. nov.

Cephalothorax oval, sides evenly rounded, thoracic groove long; eye area raised; all eyes diurnal, anterior row strongly recurved, a.m.e. largest of the eight, posterior row straight; quadrangle of median eyes higher than wide; clypeus convex and much higher than quadrangle; mandibles long and vertical, with no boss; labium rebordered, at least twice as wide as long; sternum longer than wide and extending between fourth coxae; colulus present; first pair of legs in both sexes very long and enlarged, tibia with at least one raised prolateral spine near distal end, metatarsus with a series of small, lateral spines, no comb on fourth tarsus, four pairs of trichobothria on tibia, none elsewhere; male palpus as long as cephalothorax with patella small, tibia much swollen and almost covering tarsus; epigynum a long thick scape.

Genotype *Lucarachne tibialis* spec. nov.

The position of this genus is uncertain. As it lacks a comb on the fourth tarsus and has a rebordered lip, it can not be placed in the Theridiidae. A small dark hook in the male palpus may be a paracymbium, and the thick hairy scape of the epigynum is very similar to *Meta*. The palpal organ is very simple, and the clypeus is high, two characters that are not uncommon in the Argiopidae. Probably *Theridion eidrelicola* Simon, from Venezuela, belongs in this genus, although he does not mention the curvature of the anterior eye row or the shape of the epigynum.

LUCARACHNE TIBIALIS spec. nov.

Figures 116–120, 123

Male. Length 1.8 mm., ceph. 0.8 mm., abd. 1.0 mm.

Cephalothorax a dull brown, shaded with gray, showing radial striae, longer than wide, (7.0 : 5.5), cephalic portion slightly higher, thoracic groove long and distinctly marked, sides evenly rounded; eyes on a low tubercle, all diurnal, covering the middle two-thirds of the head and carried forward slightly, anterior row strongly recurved, eyes surrounded by black, a.m.e. largest of the eight, separated by less than a diameter and almost touching a.l.e., posterior row straight, slightly longer than anterior, eyes equidistant, not surrounded by black, p.m.e. white, separated by less than a diameter, lateral eyes subequal and touching; quadrangle of median eyes wider in front and higher than wide; clypeus convex and twice as high as quadrangle; mandibles brown, vertical and long, with no boss; sides parallel; fang groove slightly oblique, superior margin with two sharp teeth, inferior with a distinct carina, on under side of mandibles an oblique row of hairs from fang groove to base; labium fused to sternum, more than twice as wide as long, and strongly rebordered; maxillae several times longer than labium, when in position almost touching mandibles, much wider at tip than at base, outer margins parallel, tips straight and almost touching; sternum dark brown, shaded with dark gray, heart-shaped, smooth, slightly convex, as wide as long, carried between IV coxae as a wide lobe, emarginate between III coxae; abdomen oval, base high, pale gray with four pairs of dark oblique spots connected on median line, sides shaded with gray, entire dorsum covered with long hairs almost heavy enough to be called bristles, venter dark gray with two pairs of pale spots, colulus small, tracheal spiracle close to spinnerets; legs, 1–4–2–3, I pair very long, femur dark brown, slightly enlarged and bent, covered with fine hairs, tibia paler with median and apical dark rings, long and slightly enlarged at distal end, on prolateral side near tip is a long stout spine from a raised base, above this spine are two stout bristles, and just below are several long bristles, metatarsus pale, curved, and one quarter from tip is a spine which curves and is parallel to joint, from base to curved spine, a row of nine curved cusps, femora and tibiae II, III and IV pale, with three dark rings, IV femur a ventral apical row of long bristles, all patellae with a long spine at tip, and all tibiae with a long, basal dorsal spine, four pairs of trichobothria on tibiae, none elsewhere, no comb on IV metatarsus;

palpus as long as cephalothorax, femur slender and curved, patella little longer than wide, tibia more than twice as long as patella, much narrowed at base and suddenly swollen so that it is three-quarters as wide as long, tip truncate, seen from above on outer side is a long curved black spine more than half the length of the joint with the slender tip resting on the under side of the tarsus, tarsus reduced to a tongue-like piece about the length of the patella, with sides parallel and tip truncate, in ventral view the tibia covers the base of the tarsus and little can be seen of the palpal organ, the long black spine is probably the embolus and is supported for one-third of its length by a colorless piece, difficult to separate from the tibia, from a dorsal view in the tarsus can be seen a small dark sickle-shaped piece which may be the abortive paracymbium.

Female. Length, 2.5 mm., ceph. 1.0 mm., abd. 1.5 mm.

Cephalothorax and eyes same as in male; maxillae not as long; abdomen globose and paired spots darker; legs same as in male, I pair enlarged and longer than in male, tibia gradually enlarged towards distal end and on prolateral side produced in a larger tubercle than in male, bearing a short, stout spine, then suddenly constricted above the tubercle to tip; on side opposite to tubercle, is a crest of 10 or 12 long bristles and a row of long bristles from base to tubercle, metatarsus straight and much longer than in male with a prolateral row of 10 short spines from base to tip, all patellae with a long spine at tip, and tibiae with a long dorsal basal spine as in the male; epigynum a long thick finger which extends two-thirds the length of the venter, slightly constricted near tip, ending in a blunt point.

Holotype ♂ Cuba; Oriente, Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

Allotype ♀ Cuba; Orient, Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

Paratype ♂ ♀ Cuba; Orient, Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

The species is undoubtedly related to *Theridion cidrelicola* Simon from Venezuela, (Ann. Soc. Ent. France, 1895, **64**, p. 139). In the male of this species, the first tibia and metatarsus has a series of long slender spines terminated by a stronger raised spine; the female lacks these spines and on the fourth coxae has a large sharp spine; the male palpus has the tibia much enlarged, with a very narrow base, truncate at tip and the tarsus "extrèmement petit, réduit à une petite languette interne et en dessous un bec court et droit." The first leg and palpus are figured in Hist. Nat. Araignées, 1894, **1**, p. 536, figs. 547, 552, 553.

Lucarachne tibialis has the same modification of the first leg in both male and female, and the male has the same enlargement of the tibia of the palpus.

Genus Pseudometa F.O.P. Cambridge 1903

Pseudometa distincta spec. nov.

Figures 121, 127

Male. Length, 2.5 mm., ceph. 1.5 mm., abd. 1.5 mm.

Cephalothorax pale yellow, cephalic portion high and heavily outlined in black that is especially heavy near the thoracic depression, more than three-quarters as wide as long; eyes outlined with black, lateral eyes touching; quadrangle of median eyes higher than wide; mandibles pale with a dark spot near base on outer margin, vertical, very long and narrow, distal half constricted, boss rudimentary, margins granular, fang groove oblique, superior margin with three sharp, subequal teeth, inferior margin with four, the two middle ones very small and the last tooth large and blunt; labium pale, wider than long; maxillae more than twice as long as labium, pale, slightly divergent with tip wider than base; sternum pale, triangular, very little longer than wide, IV coxae separated by half a diameter; abdomen pale brown covered with yellow spots, a dark basal band and two pairs of dark spots, the first pair about the middle and widely separated, the second pair half way to tip of abdomen, venter pale with a broad light gray stripe in the middle; legs, 1–2–4–3, pale, I femur slightly enlarged and darker, spines, I femur, 3 long prolateral spines, 2 retrolateral, 1 median near tip, no ventral, patella, 1 dorsal at tip, tibia, dorsal, 2 slender, prolateral, 1 pair near tip, ventral, 0, metatarsus, 1 short, strong prolateral spine near base from a small tubercle, ventral, 0, II pair, spines same as on I pair but much smaller, tibiae, metatarsi, and tarsi covered with rows of bristles, palpus about as long as cephalothorax, tibia longer than patella and wider at tip; apophysis from cymbium divided, upper portion short, broad and dark with a bilobed tip, lower branch almost as long as tibia, recurved, ending in a slender tip, on upper side of cymbium a pale horn projecting forward, and from base a slender process with a dark tip, cymbium pale, covered with long hairs, and only partly covering the palpal organ, embolus and conductor at tip of bulb, each making a complete circle to form a flat disc at right angle to cymbium.

Female. Length, 3.2 mm., ceph. 1.6 mm., abd. 2.2 mm.

Cephalothorax and eyes same as in male but dark outlines of cephalic area much wider; mandibles pale with a dark spot near base, swollen but not constricted as in male, fang groove slightly oblique, superior margin with three subequal teeth, inferior margin with four teeth, the two middle very small, last tooth not enlarged as in the male; abdomen globose, broad across the base, pale brown, covered with pale yellow spots, no dark basal band, and the two pairs of dark spots found in male indistinct, venter with broad dark stripe from fold to spinnerets; legs, 1–2–4–3, pale, I femur with three dark lateral spots, basal, median and distal, with 4 slender prolateral spines on distal half, tibia pale with a distinct dark band at tip and many slender bristles, metatarsus and tarsus pale with dark bands at tips and rows of long bristles, II pair, femur with one dark lateral spot near distal end, no spines, tibia, metatarsus and tarsus same as I pair; epigynum, area swollen, median septum with a very narrow base, suddenly widening so that at margin it is wider than long, margin only slightly convex, openings apparently are ovals on each side of septum, beneath the skin can be seen the dark sacs of the spermatheca.

Holotype ♂ Cuba; Oriente, South side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Allotype ♀ Cuba; Oriente, South side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Paratype ♂ ♀ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Paratype ♀ Cuba; Pico Turquino, 6,000 feet, 25 June, 1936, (Darlington).

Franganillo has reported two Central American species of *Pseudometa* from the Sierra Maestra. *P. distincta* can be easily separated from them by the palpus and the epigynum.

Pseudometa linguiformis (Franganillo)

Figure 128

Meta linguiformis Franganillo, 1930, p. 20; ibid., 1936, p. 94, fig. 47.

Female. Length, 5.0 mm., ceph. 2.4 mm., abd. 3.0 mm. long, 2.8 mm. wide.

Cephalothorax pale brown, cephalic portion sharply marked from thoracic and heavily veined with black, ending in a black spear-mark

at depression; eyes subequal and ringed with black, anterior row recurved, a.m.e. separated by a diameter and from a.l.e. by a diameter and a half, posterior row same length, straight, p.m.e. largest of the eight, separated by about a diameter and from p.l.e. by a diameter and a half, lateral eyes touching and subequal; quadrangle of median eyes same width in front as behind and wider than high; clypeus less than diameter of a.m.e.; mandibles swollen in front, heavily veined in black, boss rudimentary, superior margin of fang groove with three subequal teeth, inferior margin with four, the two middle very small; labium wider than long, tip rebordered; maxillae slightly divergent, tips widened; sternum triangular, dark with an irregular pale mark in center, IV coxae separated by less than a diameter; abdomen pale with dark spots irregularly placed, almost as wide as long, venter pale with a dark spot in center; legs, 1–2–4–3, pale with many dark spots that are most numerous on ventral side, spines, I femur, 1 prolateral spine, anterior metatarsi and tarsi with rows of fine bristles; epigynum a convex area, wider than long, with a median tongue-like lobe extending up from the fold, the openings are apparently circular depressions each side just anterior to the fold.

♀ Cuba; Soledad Mountains, 10 March, 1925, (Salt).

♀ Cuba; Pinar del Rio, San Vicente, July, (Archer).

3 ♀ Cuba; Solidad, San Jose, 31 July, 1931, (Worley).

♀ Cuba; Mountains North of Imias, 3,000–4,000 feet, 25 July, (Darlington).

♀ Cuba; Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

♀ Cuba; Sierra de Cobre, 3,000–3,800 feet, 3 July, 1936, (Darlington).

♀ Cuba; Oriente, Los Llanos, 1,000–2,000 feet, 16 July, 1936, (Darlington).

According to Franganillo, this species is found all over the island. Only females have been seen. All specimens have the ventral side of the femora heavily spotted but the dark triangle on the venter is sometimes obscure.

Sub-family NEPHILINAE

Genus Nephila Leach 1815.

Nephila clavipes (Linnaeus)

Aranea clavipes Linnaeus, Syst. Nat., 1758, p. 1034, no. 27.
Nephila clavipes, Petrunkevitch, 1930, p. 247, figs. 101, 102.

This species is found in the southern part of the United States,

Bermuda, Central America, and the northern part of South America. It is very common in the garden at Soledad and has been taken at Havana. Both males and females were collected in August in the Sierra de Rangel by Darlington, and at an altitude of 2,000 feet at Cuchillo de Gujimero. Petrunkevitch found it only on the grounds of the College of Agriculture in Mayaguez in Puerto Rico, and because of this limited distribution, he thinks that it has been recently introduced.

Sub-family TETRAGNATHINAE

Genus AGRIOGNATHA O.P. Cambridge 1896

AGRIOGNATHA SIMONI spec. nov.

Figures 122, 124, 125

Male. Length, 5.0 mm., ceph. 2.0 mm., abd. 3.0 mm.

Cephalothorax smooth, cephalic portion much narrowed, shaded dark brown to thoracic groove, dark about lateral margins, thoracic groove a deep circular depression; eyes covering entire anterior margin, anterior row strongly recurved, a.m.e. separated by more than a diameter and from a.l.e. by almost two diameters, posterior row recurved, p.m.e. separated by less than a diameter, slightly larger than a.m.e., lateral eyes on a common tubercle, touching and subequal; quadrangle of median eyes wider in front and as high as wide; clypeus below a.m.e. only a line; mandibles dark brown, strongly divergent, so that width at tips is greater than length of cephalothorax, no boss but an upward turned tooth on outer corner at base, from this is a distinct carina to base of fang, above origin of fang is a large stout tooth directed outward, similar to *Pachygnatha*, fang groove horizontal, superior margin with three subequal teeth near base of fang, inferior margin with four teeth, three near fang and a much smaller one near median margin, area between carina and fang groove slightly excavate, fang long and sinuous, slightly constricted at middle with a tooth on inner side; labium dark, as wide as long with a rebordered tip; maxillae more than twice as long as labium, sides parallel and tip slightly widened; sternum dark, triangular, slightly emarginate opposite II and III coxae, IV coxae almost touching; abdomen almost three times as long as wide, truncate at base and rounded at tip; median stripe of dull gray bordered by a waving black line which is broken about middle, and near tip is connected so that abdomen appears all black, sides dull yellow with irregular flecks of white and

silver, a large dark spot on distal end, venter dull gray with a pair of widely separated pale stripes which end in spots each side of spinnerets, which are at tip of abdomen; legs, 1–2–4–3, anterior pairs long and slender, yellow shaded with dark gray, spines, I pair, femur, ventral, a median row of 5 short spines, dorsal and lateral irregular, patella, dorsal, 1 at tip, retrolateral, 1, tibia, irregular, metatarsus, irregular with a prolateral series of spinoform setae and dark spinules, II pair, femur, dorsal, 2 short near base, lateral, irregular, 1 long strong retrolateral spine near tip and a chitinized ridge on ventral side of patella against which spine rests, patella, dorsal, 1 at tip, retrolateral, 1, spines on tibia and metatarsus irregular, posterior pairs with irregularly placed spines, 6 or 7 short, straight trichobothria at base on prolateral side of IV femur; palpus not as long as cephalothorax, pale, a long trichobothria at tip of patella and several on tibia, palpal organ of the *Pachygnatha* type, bulb globose, with cymbium reduced to a narrow piece which extends over bulb though hardly reaches the top of it, paracymbium even more narrow, with parallel sides reaching only middle of bulb, embolus and conductor confined to tip of bulb, embolus with a short circular turn near tip.

Female. Length, 6.5 mm., ceph. 2.2 mm., abd. 4.6 mm.

Cephalothorax pale yellow, shaded with gray about the lateral margins and very faintly in the median line to thoracic depression, anterior margin about half the greatest width but not narrowed as much as in the male; eyes cover the entire margin, anterior row not as strongly recurved as in the male, a.m.e. separated by less than a diameter and from a.l.e. by more than a diameter, posterior row slightly recurved, p.m.e. larger than a.m.e., separated by less than a diameter, lateral eyes touching on a low tubercle, a.l.e. larger than p.l.e.; quadrangle of median eyes wider in front and as high as wide; clypeus below a.m.e. little more than a line; mandibles pale, vertical, slightly geniculate, a distinct carina at base on outer margin in place of the tooth found in male, superior margin with three teeth, two near base of fang and one near median margin, inferior margin with four teeth, two near base of fang small, other two much larger, fang evenly curved; labium pale, as long as wide, tip rebordered; maxillae pale, twice as long as labium, tips much widened with black margin; sternum pale, triangular, emarginate opposite III coxae; abdomen yellowish, flecked with white and silver spots, a median pair of parallel, narrow, wavy, dark lines which are connected near the tip to form the first of three cross bars, base truncate, tip rounded, venter gray with a pair of spots in front of spinnerets which are at the tip of the abdomen; legs,

1–2–4–3, anterior pairs very long, pale with indistinct dark bands at tip of femora, at base, middle and tip of tibiae, III pair with tibia and metatarsus dark, IV pair pale, spines scattered on all legs, I and II femora, ventral, 5 short spines in series on basal half, no large retrolateral spine on II femur; epigynum, a slightly recurved line showing no structure.

Holotype ♂ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Allotype ♀ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Paratypes 4 ♂ 5 ♀ Cuba; Pico Turquino, (Darlington).

Paratypes ♂ 2 ♀ Cuba; Mountains North of Imias, 3,000–4,000 feet, July, 1936, (Darlington).

Franganillo in 1936 described *Cyrtognatha aproducta* from Havana. The description is very brief and neither sex nor size is noted. In 1930, he described *Cyrtognatha producta* from the Sierra Maestra, again without mentioning sex or size and with barely generic characters. In his revision of 1936, neither species is mentioned. The name *Cyrtognatha* is preoccupied and the genus *Agriognatha* O.P. Cambridge is synonymous. It may be that there is but one species of *Agriognatha* found in Cuba, in which case, *aproducta* would have priority.

At present, the genus includes six species; three from Central America, one from Peru, one from St. Vincent, and one from Cuba. *A. nigrovittata* from Peru and *A. serrata* from St. Vincent are described with a carina on the mandibles, and all apparently have the large tooth at base of the fang.

Genus Alcimosphenus Simon 1895

Alcimosphenus licinus Simon

Alcimosphenus licinus Simon, Hist. Nat. Araignées, 1895, **1**, p. 930; Petrunkevitch, 1930, p. 263, figs. 115, 116.

This species was described from Jamaica and San Domingo, and has since been reported from Haiti, Puerto Rico, Cuba, and Dominica. Petrunkevitch figures the female in his paper.

♀ Cuba; Santiago de las Vegas, Banks Coll.

♀ Cuba; Pinar del Rio, San Vicente, (Archer).

♀ Cuba; Sierra de Cobre, Loma del Gato, 2,600–3,325 feet, (Bruner).

♀ Cuba; Los Llanos, 1,000–2,000 feet, 20 July, 1936, (Darlington).

♀ Cuba; Pinar del Rio, Sierra de Rangel, 24 August, 1936, (Darlington).

Genus Allepeira Banks 1932

Allepeira basilica (McCook)

Epeira basilica McCook, 1878, p. 124.
Hentzia basilica, McCook, 1893, p. 244, pl. 14, fig. 2, pl. 23, fig. 8. (*Hentzia* preoccupied by Marx, 1883, for *Attus palmarum* Hentz).

Originally found in Texas, this species has been taken in Washington and Oklahoma.

♂ ♀ Cuba; Havana, 12 June, 1924, (Banks).

Genus Glenognatha Simon 1887

Glenognatha minuta Banks

Figure 126

Glenognatha minuta Banks, 1898, p. 248, pl. 15, fig. 15.

Male. Length, 2.2 mm., ceph. 0.9 mm., abd. 1.3 mm.

Cephalothorax yellowish-brown, no thoracic groove, cephalic portion high and distinctly marked; eyes surrounded by black, anterior row recurved, a.m.e. separated by a little more than a radius, a.l.e. smaller and separated from a.m.e. by a diameter of a.m.e.; posterior row straight, p.m.e. largest of the eight, separated by less than a radius, and from p.l.e. by more than a diameter, lateral eyes touching and subequal; quadrangle of median eyes about square; clypeus convex, about as high as quadrangle; mandibles brown, no boss, divergent from base, fang groove oblique and long, superior margin with three teeth, first two the largest, inferior margin with a minute cusp at base of fang, followed by three, the first two very large and in a straight line with the last tooth, fang long and slender; labium much wider than long; maxillae three times as long as labium and inclined over labium; sternum brown, triangular, as wide as long, widest between first coxae and squarely truncate between fourth coxae; abdomen grayish-brown, faintly tinged with pink at base, three pairs of irregular pale spots on posterior half and many long hairs, venter brownish with a pair of widely separated elongate pale spots, ventral furrow distinct and very near the spinnerets; legs pale yellow, darkened at tips of joints, covered with fine hairs, no spines but hairs in rows on posterior pairs, anterior pairs very long; palpus, femur pale, half as long as cephalothorax, tibia much narrowed at base, more than twice as wide at tip, and twice as long as wide, basal lobe of cymbium barely reaches top of bulb, and at distal third bends abruptly.

♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).

The type of this species is from San José del Cabo, Baja California. It is a little larger than the Cuban specimen, and differs in the proportion of the basal lobe of the paracymbium. In the type, the lobe is narrower, the bent portion shorter, and the tibia is a little shorter but the difference is hardly enough to erect a new species.

Genus Leucauge White 1841

Five species of *Leucauge* have been seen from Cuba. *Leucauge argyra* (Walckenaer) is the largest, and is easily recognized in the male by the large hook on the dorsal side of the cymbium, and in the female by the backward turned tip of the epigynum.

Leucauge regnyi (Simon) is the most common species, and is easily recognized by the two pairs of shoulder angles at the base of the abdomen. In the males, these angles are sometimes indicated by dark spots.

Only females of *Leucauge moerens* (O.P. Cambridge) have been seen. These are very dark, and on the venter are two pairs of pale spots; the epigynum is a broad oval opening with a very wide septum, often faintly indicated.

Leucauge spiculosa spec. nov. resembles *L. venusta* (Walck.), but it has spicules on the posterior portion of the cephalothorax, and the epigynum is much wider than long with the openings nearer the base than to the fold.

Leucauge venusta (Walck.) = *L. hortorum* (Hentz) has been reported from Santiago de las Vegas, but the specimens in the museum collection are immature. Franganillo reports it as common all over the island and declares it to have four basal angles, but has evidently confused it with another species. Franganillo described still another species, *Leucauge pinarensis,* from Pinar del Rio which he also later found common all over the island. He compares it with *L. moerens* (Cambr.) and figures a palpus with a very short tibia.

Leucauge argyra (Walckenaer)

Tetragnatha argyra Walckenaer, 1837, **2**, p. 219.
Leucauge argyra, Petrunkevitch, 1930, p. 285, figs. 119, 120.

This species has a wide distribution from Florida and California through Mexico, Central America, and the West Indies. It is very abundant in collections from all parts of Cuba.

Leucauge moerens (O.P. Cambridge)

Opas moerens O.P. Cambridge, 1896, p. 185, 229, pl. 23, fig. 6.
Argyroepeira pulcherrima, ibid., p. 230, (not *Argyroepeira pulcherrima* Keyserling).
Leucauge moerens, F.O.P. Cambridge, ibid., 1903, p. 441, pl. 42, figs. 6, 7; Petrunkevitch, 1930, p. 271, figs. 128–130.

Petrunkevitch found a single specimen at Mayaguez, Puerto Rico, and inferred that it was an introduced species. Several females have been found in the garden at Soledad. Franganillo has not seen it.

♀ Cuba; Soledad, garden and quarry, August 1931, (Worley).

Leucauge regnyi (Simon)

Argyroepeira regnyi Simon, 1897, p. 871.
Leucauge regnyi, Petrunkevitch, 1930, p. 267, figs. 123–127.

In his Spiders of Porto Rico, Petrunkevitch states that he has collected this species abundantly in Guadeloupe, Dominica, and Jamaica. It is the most common *Leucauge* at Soledad. Franganillo has taken it from all parts of the island.

Leucauge spiculosa spec. nov.

Figures 129, 130

Male. Length, 4.0 mm., ceph. 2.0 mm., abd. 2.2 mm.

Cephalothorax pale yellow, shaded with gray at thoracic depression and about the posterior margin, dark spicules on posterior margin and area covered by abdomen, all directed forward; eyes in three groups, quadrangle of median eyes narrower in front and higher than wide; mandibles pale brown with a black spot above base of fang, evenly convex, no boss, and scantily covered with short black bristles, superior margin of fang groove with two sub-equal teeth; inferior margin with four small teeth; labium dark, wider than long, tip rebordered maxillae more than twice as long as labium, tips straight and outer corner prolonged; sternum brown, triangular, ending in a point between IV coxae; abdomen truncate at base and evenly rounded at tip, half as wide as long, pale with a median black stripe on posterior half, connected at tip with broken black stripes on posterior half, venter with a broad yellow band across middle, dark gray in front and behind;

legs very long and slender with scattered spines, the usual two ventral rows of curved cilia near base of IV femur; palpus longer than cephalothorax, patella short with a long trichobothria at tip, tibia longer than terminal joint with a dorsal spine near tip as long as terminal joint, palpal organ of the usual type with embolus and conductor at tip supported by a membranous sheath.

Female. Length, 7.0 mm., ceph. 2.6 mm., abd. 4.6 mm.

Cephalothorax and eyes the same as in male; mandibles pale, more swollen, and dark bristles confined to median area above fang groove, superior margin of fan groove with two large teeth, inferior margin with three subequal teeth, labium, maxillae, and sternum same as in male; abdomen less than twice as long as wide, base truncate with same markings as in male, but median dark stripe extends beyond middle with two pairs of oblique gray lines from it on posterior half, each side has the usual golden and silver stripes, venter with pale band about middle, very dark above spinnerets; legs, pale with tibiae and metatarsi darker at tips and the usual scattered spines; epigynum wider than long with a dark chitinized area anteriorally extending to pedicel; median septum narrow at base with openings, a pair of large white circles directly below the basal fold.

Holotype ♂ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Allotype ♀ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June, 1935, (Darlington).

Paratypes 2 ♂ 8 ♀ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Paratype ♀ Cuba; Sierra de Cobre, 3,000–3,800 feet, 3–7 July, 1936, (Darlington).

This species is very near *Leucauge aurostriata* (O. P. Cambr.) but differs in the following points: distinct spicules on posterior part of cephalothorax of both male and female; quadrangle of median eyes narrower in front as in *Leucauge venusta* (Walck.). It differs from the latter species by the spicules, and in the male palpus, by the membranous sheath; in the female, by the wider epigynum with the narrow septum and openings directly below the fold.

Leucauge venusta (Walckenaer)

Epeira venusta Walckenaer, 1837, **2**, p. 90.
Epeira hortorum Hentz, 1847, p. 477, pl. 31, fig. 19.
Leucauge venusta, Petrunkevitch, 1930, p. 266, figs. 121, 122.

Probably because of its wide distribution from Maine to Panama, this species has received many names. It is not common in Cuba, and possibly has been wrongly identified by Franganillo, as he describes it with four basal angles on the abdomen, a character found only in *Leucauge regnyi*.

Genus Mimognatha Banks 1929.

Mimognatha foxi (McCook)

Theridion foxi McCook, 1893, pl. 29, fig. 1.
Mysmena bulbifera Banks, 1896, p. 66.
Glenognatha bulbifera, Barrows, 1919, p. 210, figs. 1, 2.
Diplocephalus crumbi Petrunkevitch, 1925, p. 171, pl. 8, figs. 1, 2.
Mimognatha foxi, Banks, 1929, p. 90.

Male. Length, 1.2 mm., ceph. 0.5 mm., abd. 0.8 mm.

Cephalothorax brownish-yellow, head high, cephalic portion distinctly marked, no thoracic groove; eyes surrounded by black, anterior row recurved, a.m.e. separated by more than a radius and from a.l.e. by a diameter, posterior row straight, p.m.e. largest of the eight, separated by a radius, and from p.l.e. by a diameter, lateral eyes subequal and touching; quadrangle of median eyes slightly wider in front and higher than wide; clypeus a little less than height of quadrangle; mandibles vertical, divergent on distal half, fang groove long and oblique, superior margin with three sharp teeth, equidistant, inferior margin with four small teeth, fang long and evenly curved; labium wider than long, about two-thirds width of sternum; maxillae twice as long as labium and about half as wide as long, slightly inclined over labium; sternum triangular, slightly wider than long, widest between II coxae, truncate between IV coxae, flat with scattered black hairs; abdomen flesh-colored with scattered dark hairs and a silvery spot each side near the spinnerets; legs long and very slender, no spines but many short hairs, anterior pairs very long; palpus, femur more than half length of cephalothorax, tibia shorter than patella, only little longer than wide, paracymbium straight, very narrow, and only slightly swollen at tip which does not reach the middle of the bulb, bulb very large, globose, embolus and surrounding parts very small, cymbium much reduced in size.

Female. Length, 1.6 mm.

Very similar to male but the mandibles not quite as much swollen;

abdomen with the same silvery markings on dorsum; epigynum almost in the middle of the venter; area convex, and only the straight line of the fold can be seen.

♂ 5♀ Cuba; Soledad, 1–11 August 1934, (Darlington).

This spider is widely distributed from southern New England to Florida, but because of its small size, it is often overlooked. The male was figured by McCook but not described. Barrows described the mating and the round web in 1919. It is a smaller species than *Glenognatha minuta* Banks, the mandibles are not divergent from the base, and the three teeth on the superior margin of the fang groove are all sharp. Dr. Petrunkevitch describes as *Diplocephalus gloriae* from Puerto Rico, a species which is probably a *Mimognatha*, but the description of the teeth on the mandibles and the quadrangle of median eyes shows that it cannot be *M. foxi*.

Genus Pachygnatha Sundevall 1823.

Pachygnatha autumnalis Keyserling

Pachygnatha autumnalis Keyserling, Verh. K. K. Zool. Bot. Gesell. Wien, 1883, **33**, p. 660, pl. 21, fig. 10; Emerton, 1884, p. 337, pl. 34, fig. 22,pl. 40, fig. 9.

The type in the Marx Collection is from Harrisburg, Pennsylvania. All the species of the genus are found in the temporate zone.

♀ Cuba; Soledad, 1–11 August, 1934, (Darlington).

Genus Tetragnatha Latreille 1804.

The genus *Tetragnatha* was established by Latreille in 1804, and in 1810 he definitely fixed *extensa* Linn. as the type. Species of the genus are found in all parts of the world, and many are widely distributed. According to Seeley, who in 1928 redescribed the species found in the United States, the genus *Eugnatha* Audouin is clearly a synonym and can not be used either as a genus or a subgenus. In 1881, Simon separated the species with a long post-abdomen as a genus name *Eucta*. *Tetragnatha caudata* Emerton was placed here, but according to Seeley, the genus does not differ from *Tetragnatha* except by the long post-abdomen. All Cuban species have been placed in *Tetragnatha* and only in the key have the divisions been indicated.

Long, slender spiders with very long legs and in the males, elongate mandibles.

Key for males

1. Abdomen extended beyond spinnerets ..... *caudata*
   Spinnerets terminal, or placed just under the tip of abdomen 2
2. Lateral eyes of each side farther apart than the median 3
   Lateral eyes of each side not as far apart as the median 4
3. Dorsal spur pointed, mandibles about parallel, almost as long as cephalothorax, no "large tooth" on upper margin; tibia of palpus almost twice length of patella ..... *pallescens*
   Dorsal spur truncate, mandibles divergent, about one-half length of cephalothorax, "large tooth" distinct; tibia of palpus scarcely longer than patella ..... *orizaba*
4. Legs without spines, patella of palpus longer than tibia, paracymbium very short, ... *tenuissima*
   Legs with spines, ... 5
5. Dorsal spur at apex, "large tooth" missing, tibia of palpus one and a half times the patella, ... *seneca*
   Dorsal spur not at apex, ... 6
6. Dorsal spur not bifid, but with cusp below, two large teeth at apex, so that it appears to be three large teeth; mandibles longer than cephalothorax, "large tooth" missing, tibia of palpus twice length of patella, ... *antillana*
   Dorsal spur bifid, "large tooth" conspicuous 7
7. Two large teeth on apical side of "large tooth", one next, large broad, conspicuous; tibia of palpus twice length of patella; conductor at an angle to cymbium and dilate at tip ..... *dentigera*
   One tooth on apical side of "large tooth"; fang not evenly curved, conductor with a pointed tip, parallel and protected by cymbium *elongata*

Tetragnatha antillana Simon

Tetragnatha antillana Simon, 1897, p. 868; F.O.P. Cambridge, 1903, p. 433, pl. 41, figs. 5, 6; Petrunkevitch, 1930, p. 281, figs. 141–147.

Described from St. Vincent, this species has been found throughout Central and South America, in Puerto Rico, and Antigua.

♂ ♀ Cuba; Soledad, garden, July, August, 1931, (Banks and Worley).

♂ Cuba; Havana, (Cervera).

Tetragnatha caudata Emerton

Tetragnatha caudata Emerton, 1884, p. 335, pl. 39, figs. 16, 22; Seeley, 1928, p. 107, pl. 1, figs. 5–10.

This is not a common species, but it has been found from Maine to Florida, always near water.

♀ Cuba; Soledad, garden, 11 August, 1931, (Worley).

Tetragnatha dentigera F.O.P. Cambridge

Tetragnatha dentigera F.O.P. Cambridge, 1903, p. 431, pl. 40, fig. 14.

Male. Length, 6.5 mm.

Cephalothorax brown; eyes, anterior row recurved, a.m.e. largest, separated by less than a diameter, a.l.e. smallest, separated from a.m.e. by a diameter and a half, posterior row straight, and equidistant, p.m.e. slightly larger than p.l.e., lateral eyes separated by diameter of p.l.e. but tubercles connected; mandibles divergent, almost as long as cephalothorax, dorsal spur not at apex, long, with tip notched, superior margin of fang groove with "large tooth" conspicuous, two smaller teeth nearer origin of fang, the middle one very broad, heavy and conspicuous; "large tooth" followed by six graduated teeth, inferior margin with two heavy tooth connected at base near origin of fang, followed by eight very minute teeth, fang slightly sinuous; palpus, femur as long as mandible, tibia twice length of patella, paracymbium with a rounded tip and lobe lightly nearer tip than base, embolus and conductor long, latter dilate at tip, and ending with a curved hook at an angle from the cymbium.

♂ ♀ Cuba; Soledad, garden, August 1931, (Banks).

Tetragnatha elongata Walckenaer

Tetragnatha elongata Walckenaer, 1805, p. 69.

Tetragnatha grallator Hentz, 1848, p. 26, pl. 4, figs. 1, 2; Seeley, 1928, p. 109, pl. 1, figs. 11–13, pl. 2, figs. 14–16.

A common species in the United States from the Atlantic to the Pacific. Petrunkevitch did not find it in Puerto Rico, and Franganillo has not recognized it.

♂ Cuba; Havana, (Cervera).

♂ ♀ Cuba; Soledad, garden, August, 1931, (Worley)

♀ Cuba; South side Pico Turquino, June, 1936, (Darlington).

♀ Cuba; Sierra de Cobre, 3,000–3,800 feet, July, 1936, (Darlington).

Tetragnatha orizaba (Banks)

Figure 135

Eugnatha orizaba Banks, 1898, p. 248, pl. 15, fig. 16.
Tetragnatha orizaba, Seeley, 1928, p. 130, pl. 3, figs. 36–39.

Originally found in Mexico, this species has since been reported in Florida and Cuba.

♂ ♀ Cuba; Soledad, garden; Vilches Hill, July, August, 1931, (Worley).

Tetragnatha pallescens F.O.P. Cambridge

Tetragnatha pallescens F.O.P. Cambridge, 1905, p. 436; Petrunkevitch, 1930, p. 274, figs. 131–137.
Tetragnatha pallida Banks, 1892, p. 51, pl. 5, fig. 88. (*pallida* preoccupied by O. P. Cambridge, 1889).

A species with a very wide distribution but not common anywhere in the United States. Petrunkevitch found it abundant in Puerto Rico. Franganillo reports it from the Oriente.

♂ ♀ Cuba; Havana, (Cervera).

♂ ♀ Cuba; Soledad, garden, July, August, 1931, (Worley).

Tetragnatha seneca Seeley

Tetragnatha seneca Seeley, 1928, p. 134, pl. 4, figs. 44–48.

Male. Length, 5.0 mm., ceph. 2.2 mm., mand. 2.0 mm.

Cephalothorax reddish-brown; eyes, anterior row recurved, a.m.e. separated by a diameter and from a.l.e. by at least two diameters, a.l.e. smallest of the eight, posterior row slightly recurved, subequal and equidistant, lateral eyes almost touching; mandibles not quite as long as cephalothorax, slightly divergent, dorsal spur nearly over origin of fang, not bifid, superior margin of fang groove with two large teeth near base of fang, "large tooth" missing, followed by a series of four or five graduated teeth, inferior margin with large tooth beneath fang, followed by a group of four teeth and then two much smaller, fang only slightly sinuate but bent near the tip; legs with few spines; palpus, femur little more than half the length of mandibles; tibia one and a half length of patella, paracymbium ending in an attenuate point, lobe very distinct just below the middle, conductor extends beyond the cymbium with an abrupt turn near tip, embolus straight and does not reach the apex of the conductor.

♂ Cuba; Havana, (Cervera).

♂ ♀ Cuba; Ciénaga de Zapata, Central Covadonga, 16 September, 1936, (Davenport).

♂ ♀ Cuba; Soledad.

This species is widely distributed from New England to Florida but it is not abundant anywhere. It is separated from *T. extensa* by the position of the dorsal spur, lack of "large tooth" on the fang groove, and the lateral eyes closer together.

Tetragnatha tenuissima O.P. Cambridge

Figure 134

Tetragnatha tenuissima O.P. Cambridge, 1889, p. 8, pl. 1, figs. 12, 13; ibid., 1903, **2**, p. 432, pl. 40, figs. 16, 17; Petrunkevitch, 1930, **30**, p. 279, figs. 138–140.

This species was described from Tabasco in Mexico. It has been recorded from Guatemala, Costa Rica, Panama, and Puerto Rico. The male is easily identified as the patella of the palpus is longer than the tibia, and the paracymbium is very short, not covering the bulb. The legs are spineless. Franganillo found it at Camaguey and Baracoa.

♂ ♀ Cuba; Soledad, Trinidad Mountains, March 1925, (Salt and Myers).

♂ ♀ Cuba; Soledad, Vilches Hill, July 1931, (Worley).

♂ Cuba; Ciénaga de Zapata, Central Covadonga, 16 September, 1936, (Davenport).

♀ Cuba; Havana, (Cervera).

Sub-family THERIDIOSOMATINAE

Genus Theridiosoma O.P. Cambridge 1878

Theridiosoma argenteo-lunulatum Simon

Figures 131, 132

Theridiosoma argenteo-lunulatum Simon, 1896, p. 484, pl. 13, figs. 9–11.

Female. Length, 2.5 mm.

Cephalothorax brown, cephalic portion dusky-black, with a wide dusky marginal band on thoracic portion, head high; eyes, anterior row straight or slightly recurved, subequal, a.m.e. diurnal and almost touching, separated from a.l.e. by a radius, posterior row straight, so

that lateral eyes are touching, p.m.e. angular, largest of the eight, separated by a line, and from p.l.e. by a radius; quadrangle of median eyes higher than wide; clypeus about equal to diameter of a.m.e. and retreating; mandibles swollen at base, vertical, superior margin of fang groove with three teeth, inferior with one tooth; sternum convex, pale brown with numerous stiff hairs, widest between II coxae and truncate at tip, so that IV coxae are separated by a diameter; abdomen globose, grayish-black with a broad crescent-shaped, silver band on dorsum, venter grayish; legs, 4–1–2–3, pale brown, posterior pairs with traces of dark bands, rather short, anterior pairs heavier than posterior, with prolateral row of bristles on metatarsus, no spines; epigynum much wider than long and protruding from the abdomen.

Male. Length, 1.4 mm.

Cephalothorax brownish-yellow, cephalic portion very high, thoracic portion excavate and covered by the abdomen; eyes anterior row slightly recurved, subequal and equidistant, a.m.e. diurnal and almost touching, posterior row straight; p.m.e. largest of the eight, angular, almost touching, separated from p.l.e. by less than a diameter, p.l.e. smaller than a.l.e. and touching; quadrangle of median eyes narrower in front and wider than high; clypeus as high as quadrangle, convex; mandibles vertical, cone-shaped, without a boss, fang groove short, superior margin with three teeth, fang small; labium fused to sternum, lateral margins dark, convex, more than two-thirds as wide as long, IV coxae separated by more than a diameter; abdomen globose, base very high and extending over cephalothorax, grayish with a broad crescent-shaped, pale, basal band, and pale lateral stripes, venter dark, with darker concentric rings about spinnerets broken on sides by the pale lateral stripes; legs, 1–2–4–3, anterior pairs heaviest, darker at tips, no spines, tibiae and metatarsi with prolateral row of bristles, posterior pairs much shorter, no spines or long bristles on tibiae; palpus not as long as cephalothorax, terminal joint large and very similar to others in the genus.

Allotype ♂ Cuba; Pico Turquino, 1,500–3,600 feet, 11 July, 1936, (Darlington).

♀ Cuba; Pinar del Rio, San Vicente, July, (Archer).

The type, a female, was described from St. Vincent. The male differs from the female in the much higher clypeus and the longer and more slender anterior legs. The epigynum is quite distinct from the figure of *Theridiosoma nechodomae* Petrunkevitch from Puerto Rico. The male palpi of all members of the genus are very similar.

Genus Wendilgarda Keyserling 1886.

Wendilgarda theridionina Simon

Wendilgarda theridionina Simon, Hist. Nat. Araignées, 1895, **1**, p. 919, fig. 986; Petrunkevitch, 1930, p. 297, figs. 162–167.

This species was described from Venezuela, and Simon later reported it from St. Vincent. Petrunkevitch found it abundant in the Luquillo Mountains of Puerto Rico; he gives a detailed description and figures of both male and female. At Soledad it was collected in the dead leaves of the lily pond in the garden.

♂ ♀ Cuba; Soledad, garden, August 1931, (Banks and Worley).

Sub-family GASTERACANTHINAE

Genus Gasteracantha Sundevall 1833

Gasteracantha cancriformis (Linn.)

Aranea cancriformis Linnaeus, Syst. Nat., **2**, 1767, ed. 11, p. 1037.
Gasteracantha cancriformis, Petrunkevitch, 1930, p. 249, figs. 103–103d.

This is the most common *Gasteracantha* in the West Indies. It is found in the southern part of the United States and south to Paraguay. It is very abundant in all parts of Cuba, but because the male is so very small, it is not often seen in collections. Mr. Banks swept one in the garden at Soledad. Franganillo has described three varieties, all from females, and apparently based on color.

Genus Micrathena Sundevall 1833

Four species of *Micrathena* have been seen from Cuba. Franganillo has identified several more, among them two that are common to the United States and Mexico. The genus is confined to the New World, and has a large number of species in Central America and the northern part of South America. Most species are known only from females. These are easily separated by the number, size, and position of the spines on the abdomen. The males are very much smaller, and the abdominal spines are much reduced in size or are entirely lacking. Males of the four species have been seen as well as a fifth male from the eastern part of the island, probably a species not yet recognized from Cuba.

Females

1. Abdomen with many short spines; above spinnerets higher than wide, ... *mammillata*
   Abdomen with the usual number of spines; above spinnerets not as high as wide, ... 2
2. Abdomen with no anterior spines; posterior spines divergent and evenly reduced ..... *militaris*
   Abdomen with anterior spines 3
3. Anterior spines almost parallel, directed anteriorly; posterior pair very short ..... *cubana*
   Anterior spines directed outward; posterior pair only slightly divergent, long, with hairy, swollen tips ..... *forcipata*

Males

1. Abdomen more than three times as long as wide, tip broadly truncate and hairy, ... *mammillata*
   Abdomen less than three times as long as wide 2
2. Abdomen as long as wide at posterior margin, base one-third width of posterior margin ..... *cubana*
   Abdomen longer than wide 3
3. Abdomen more than twice as long as wide, rectangular ..... *spec.*
   Abdomen about twice as long as wide 4
4. Abdomen as wide at base as at posterior margin ..... *forcipata*
   Abdomen less than half as wide at base as at posterior margin. *militaris*

Micrathena species

Figure 139, 143

Male. Length, 4.1 mm., ceph. 1.5 mm., abd. 2.6 mm.

Cephalothorax chestnut-brown, smooth, two-thirds as wide as long, (8 : 12), anterior margin nearly two-thirds greatest width, (5 : 8), widest between III pair of legs, thoracic depression round, opposite II coxae a pair of widely separated lateral pits the same size as median, posterior margin less than anterior; eyes in three groups, a.m.e. carried forward, separated by about a diameter; quadrangle of median eyes slightly wider in front; clypeus as high as quadrangle; sternum dark

brown, roughened, carried between posterior coxae so that it is emarginate between III coxae, IV coxae almost touching; abdomen rectangular, base but little narrower than tip, both truncate, sides parallel, a broad dark brown median stripe from base to tip with lateral margins indented by two pairs of pale spots, one near base and the other beyond middle, a median triangular pale spot just behind middle touching posteriorly the elongated posterior muscle spots, venter dark, spinnerets one-third distant from tip; legs, femora dark, other joints paler, anterior femora iridescent and granular, spines only on I femur, lateral, 1 near tip, dorsal, 1 at tip; palpus short but terminal joint large, patella, 1 long spine, tibia widened at tip, tarsal hook large with lower lobe very small, palpal organ of the same type as *M. cubana* but the embolus much shorter and stout, supported by a thin white sheath, beneath is a pointed piece, seen from side it is broad and flattened, beneath is an upward-turned hook.

♂ Cuba; Oriente, Los Llanos, 1,000–2,000 feet, 16–20 July, 1936, (Darlington).

Micrathena cubana (Banks)

Figures 137, 138, 144, 152, 153

Acrosoma cubana Banks, 1909, p. 163, pl. 45, fig. 2.

Female. Length, 6.0 mm., abd. 4.5 mm. long, 6.0 mm. wide between posterior spines.

Cephalothorax chestnut-brown, a deep circular depression marks the thoracic groove, three pairs of lateral depressions between lateral margins and median line, sternum heart-shaped, not indented in front of coxae; abdomen yellow with a large median black spot widest at base, sides dark with two rows of yellow spots from posterior spines to spinnerets, spines, anterior pair small, on extreme margin, directed forward over cephalothorax and almost parallel, no dorsal spines, posterior pair black, sharp and divergent, beneath, a small pair directed downward, slightly larger than anterior pair; legs, red-brown, anterior femora with two rows of ventral cusps, posterior femora, cusps confined to distal half; epigynum as figured.

Male. Length, 5.0 mm., ceph. 2.2 mm., abd 2.6 mm.

Cephalothorax dark brown, with a faint pale stripe from p.l.e., narrowing to less than half the width at posterior margin, granulate, little over half as wide as long, greatest width between II and III coxae, narrowing to almost half the greatest width at lateral eyes, low and flat,

a deep circular depression for thoracic groove, four pairs of elongate depressions between lateral margins and median line; eyes in three widely separated groups, median eyes carried foward on a lobe, a.m.e. largest of the eight, separated by less than a diameter, p.m.e. smaller, separated by a radius; quadrangle of median eyes wider in front and as wide as high; sternum deeply excavate between III pair of coxae, a space between III and IV coxae, IV coxae touching; abdomen dark chestnut-brown, mottled, a pair of round pale spots on posterior third, separated by a diameter, posterior margin almost equal to length, anterior margin equals one-third posterior, anterior pair of spines reduced to obtuse points connected by a chitinous ridge, posterior margin with two pairs of small blunt spines, one above the other as in the female, conspicuous chitinous ring surrounding spinnerets; legs spineless, except for a strong dorsal spine on I and II femora at tip, no spines on II patella, all femora with two rows of cusps, I coxa without a hook; palpus, tarsal hook bifid, upper portion in a long and curved lobe with a rounded tip, lower portion much flattened with a very broad tip which rolls upward, cymbium not covering organ, embolus very long and slender, supported by a white sheath from base to tip, below tip are two black points.

Holotype ♀ Cuba; San Diego de las Baños, Banks Coll.

Allotype ♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).

It is not impossible that *Micrathena sagittata* (Walck.) has been confused with *M. cubana*. The former has the anterior pair of spines not on the margin and they are directed upward rather than forward, the small spines beneath the posterior are lacking. Females of *M. cubana* have been found in all parts of Cuba; also three males, one from San Diego de los Baños, N. Banks Coll., one from the Sierra de Cobre, Loma del Gato, 2,000–3,325 feet, (Bruner) and the allotype.

Micrathena forcipata (Thorell)

Figures 141, 146, 149, 151

Acrosoma forcipatum Thorell, 1859, **16**, p. 300.
Micrathena cylindracea Franganillo, 1930, p. 32; ibid. 1936, p. 96.

Female. Length, 8.0 mm., ceph. 2.2 mm., abd. 6.0 mm. long, 12.0 mm. wide between posterior spines.

Cephalothorax reddish-brown, smooth, cephalic portion higher than thoracic, thoracic depression semi-circular, no paired lateral depressions; quadrangle of median eyes as wide in front as behind, higher

than wide, p.m.e. largest of eight, separated by a little over a radius, a.m.e. separated by almost a diameter; abdomen brown covered with sigillae, largest yellow spot on middle, and a pair of yellow spots anterior to dorsal spines, anterior pair yellow, very small and directed outward; dorsal pair brown, much longer, very sharp and directed upward and slightly outward, posterior pair brown, almost as long as abdomen, divergent, distal third swollen, covered with fine hairs and ending in a sharp spine, beneath posterior pair are very small sharp spines which do not show in dorsal view, venter brown with yellow spots and small sigillae, spinnerets surrounded by a chitinous ring; legs red-brown, spineless, femora with two rows of ventral cusps; epigynum deep red-brown, triangular area with oval openings near fold, separated by more than long diameter, and a small recurved finger at apex of triangle.

Male. Length, 3.5 mm., ceph. 1.6 mm., abd. 2.0 mm. long, 1.0 mm. wide.

Cephalothorax brown, smooth and shining, five-sixths as wide as long, low and rather flat, anterior margin less than half the greatest width, thoracic depression circular, about opposite III coxae, no lateral depressions; eyes in three groups, median eyes carried forward, p.m.e. separated by a diameter, quadrangle same width in front as behind and higher than wide, lateral eyes touching and on a low tubercle; sternum dark brown, only slightly notched between III coxae; abdomen almost rectangular, anterior margin straight, posterior margin rounded, dorsum flattened, no higher at posterior than at anterior end, no indications of spines, is dark brown, with narrow white basal band which is broken in two pairs of spots on sides, on anterior half is a pair of white spots followed by a single spot and a pair of white spots, venter dark, spinnerets surrounded by a distinct chitinous ring; legs granular and iridescent, no hook on I coxae, no spines on anterior femora, IV femur, 2 long dorsal spines near base, patellae I, III and IV spineless, I tibia, ventral, 6–3 spines, lateral, 2 near base, so there appears to be three rows of spines, all short, metatarsus, 0, II pair, patella, lateral, 1, distal, 1, both movable, tibia, ventral, 6–3, lateral, 0, metatarsus, dorsal, 2, ventral, 0; palpus, short, terminal joint large, femur, patella and tibia white, tibia widened at distal end but no lobe; tarsal lobe thin and chitinized as figured, embolus probably a dark short spine recurved, above a much smaller dark spur.

Allotype ♂ Cuba; Sierra de Cobre, Loma del Gato, 2,600–3,325 feet, (Bruner).

Thorell described *Micrathena forcipata* from Cuba and says, "longi-

tudine fere corporis, crassis medio augustatis, oblique sub-clavatis, apice mucronatis." Reimoser, in his monograph on *Micrathena*, 1917, places it as a synonym of *M. sexpunctata* (Hahn) from Brazil. This latter species is figured with the posterior pair of spines only slightly divergent, not swollen at the tip, and the anterior pair not on the extreme anterior margin, but subequal with the dorsal pair. Reimoser's figure of the epigynum is quite different from the specimens from Cuba.

It is with some hesitation that I synonymize *Micrathena cylindracea* Frang., since the length is given as 3.2 mm., and in the original description, it is compared with *M. vigorsi* Perty, which has the posterior pair of spines long and sharp; however, Franganillo mentions the enlarged and hairy tip. In the second description, it is compared with *M. flavomaculata* Keys. from Haiti. This species has the posterior pair of spines swollen and hairy.

The females of *Micrathena forcipata* occur in all parts of Cuba. Two males have been seen; the allotype from Loma del Gato, between 2,606 and 3,500 feet elevation was collected by S. C. Bruner, and the other from Buenos Aires, Trinidad Mountains, between 2,500 and 3,500 feet, was collected 9 May, 1936 by Dr. Darlington.

Micrathena mammillata (Butler)

Figures 142, 147, 155

Acrosoma mammillata Butler, 1873, p. 427.
Micrathena mammillata, F.O.P. Cambridge, 1904, p. 529, pl. 50, fig. 4.

Female. Length, 8.0 mm., abd. 6.5 mm. high above spinnerets.

This species belongs to the section of the genus with the abdomen above the spinnerets higher than the greatest width of the abdomen. The type of *Micrathena mammillata* came from Santarem, Brazil. F. O. P. Cambridge redescribed and figured it in the Biol. Centr. Amer. The figures show twenty pairs of spines or tubercles, three lateral pairs beneath the anterior pairs. In 1872, Taczanowski described *Micrathena horrida* from Cayenne, French Guiana, and in 1910, Petrunkevitch in the Ann. N. Y. Acad., 19, p. 212, pl. 21, figs. 9–11, wrote a new description from an adult female from Sao Paulo, Brazil. He does not mention, nor do his figures show, any lateral spines beneath the anterior pairs; also his figures of the epigynum fail to show any openings. Reimoser, in his revision of the genus in 1917, places *M. mammillata* Butler

as a synonym of *M. horrida*. Until males have been seen from near the type localities, it is hardly safe to do so. F. O. P. Cambridge suggests that *M. longicauda* Cambr. may be the male of *M. mammillata*. If that is the case, the Cuban species is undescribed because the tip of the male abdomen shows no cusps, the tibia of the palpus has a distinct lobe, and the tarsal lobe is of another shape. The epigynum of the Cuban specimens is very similar to the figure of those from Central America. The recurved finger of the epigynum starts from near the fold, and the openings are widely separated.

The female of *M. mammillata* is easily separated from *M. gracilis* (Walck.), (*rugosa* Hentz), by the number of dorsal spines, and the large tubercle immediately above the spinnerets.

Male. Length, 4.6 mm., ceph. 1.1 mm., abd. 3.6 mm. long, 0.8 mm. wide.

Cephalothorax pale brown, shaded with gray and thickly covered with small pits, thoracic depression at posterior third, cephalic portion slightly narrowed but no higher than thoracic; eyes, p.m.e. heavily ringed with black, largest of the eight, separated by less than a diameter, lateral eyes subequal on a low tubercle, quadrangle of median eyes higher than wide and slightly wider in front; sternum gray, triangular, distinctly notched between III coxae and slightly between II coxae, IV coxae separated by half a diameter, and sternum continued between, abdomen pale brown, more than a three times longer than wide, dorsum flat and covered with pale pits, anterior muscles spots dark brown, small and close together, posterior pair much larger, separated by two diameters, tip truncate, lateral margins of posterior third notched twice, as if by atrophied spines, venter covered with pits, spinnerets one third distant from pedicel, surrounded with a heavy corneous ring; legs, pale. short, and spineless except for a minute spine at end of anterior patellae; III pair directed forward, no hook on I coxae; palpus very short, patella with one long bristle, tibia with a distinct lobe beneath tarsal hook, tarsal hook slightly bilobed with a recurved tip, heavily chitinized, embolus very long and slender, and slightly curved with a parallel black piece not quite as long.

♂ ♀ Cuba; Oriente, Los Llanos, 1,000–2,000 feet, 16–20 July, 1936, (Darlington).

♀ Cuba; Pico Turquino, 1,000 feet, 25 June, 1936, (Darlington).

♀ Cuba; Pico Turquino, 1 August, 1935, (Acuña).

♀ Cuba; Oriente, Cuchillo de Guajimero, 2,000 feet, 22 July, 1936, (Darlington).

Micrathena militaris (Fabricius)

Figures 140, 145, 154

Aranea militaris Fabricius, 1775, p. 434.
Aranea armata Oliver, Encyl. Meth., 1791, **4**, p. 205.
Micrathena armata, Simon, Hist. Nat., Araignées, 1895, **1**, p. 853, fig. 910.
Micrathena militaris, Petrunkevitch, 1928, p. 53, figs. 12–15; ibid., 1930, p. 257, fig. 108.

Male. Length, 3.2 mm., abd. 1.7 mm.

Cephalothorax brown, three-quarters as wide as long, thoracic depression a circular pit, three pairs of lateral pits faintly marked; eyes in three groups, a.m.e. carried forward, separated by less than a diameter; sternum dark brown, triangular, III pair of legs directed forward and sternum extending between III and IV coxae, IV coxae almost touching; abdomen brown, about twice as long as wide, widest at posterior end where two pairs of spines can be traced, base less than half the greatest width, posterior portion high above spinnerets, venter mottled brown with a pair of irregular lateral stripes, fold slightly nearer pedicel than to spinnerets, legs, femora of anterior pairs dark brown, tibiae with prolateral dark stripe, posterior pairs pale with retrolateral dark stripe from femora to tarsi, all femora with two rows of ventral cusps; palpus, tibia with ventral process, tarsal hook leaf-like, bilobed, upper lobe with a long recurved tip, cymbium does not cover palpal organ, embolus very long, slender, and curved, protected by a semi-transparent sheath, end is hidden by a leaf-like process with spatulate tip so that tip can not be seen.

♂ Haiti.

♀ Cuba; Havana.

♀ Cuba; Soledad, 1927, (Creighton).

♀ Cuba; Sierra de Cobre, Loma del Gato, 2,600 feet, (Bruner).

♀ Cuba; South side Pico Turquino, 3,000–5,000 feet, June 1936, (Darlington).

According to Petrunkevitch, this species is found in Puerto Rico, St. Thomas and Surinam. In the museum collection there are three males and many females from Haiti. Petrunkevitch found in Puerto Rico a female with the embolus and the surrounding sheath in the epigynum. He figures this, showing the barb at the tip of the embolus.

Family MIMETIDAE

Genus Mimetus Hentz 1832

Mimetus hesperus Chamberlin

Mimetus hesperus Chamberlin, Pomona Coll. Journ. Ent. Zool., 1922, **15**, p. 5, figs. 2, 7, 8.

The type of this species is from southern California but it has been found in Texas and Arizona. It has probably been confused with *M. interfector* Hentz, but it is easily separated by the palpus and the epigynum.

♂ Cuba; Trinidad Mountains, Hanabanilla Falls, 30 April, 1936, (Darlington).

Mimetus interfector Hentz

Mimetus interfector Hentz, 1850, p. 32, pl. 4, figs. 12, 13; Emerton, 1882, p. 16, pl. 3, fig. 3.

A species found all over the United States. It has never been reported from Central America. Petrunkevitch describes a dark variety from Puerto Rico.

♂ ♀ Cuba; Soledad, February 1925, (Salt).

♂ ♀ Cuba; Soledad, August 1931, (Banks and Worley).

Family CTENIDAE

Sub-family CTENINAE

Genus Celaetycheus Simon 1897

Celaetycheus cabriolatus Franganillo

Figures 157, 160

Celaetycheus cabriolatus Franganillo, 1930, p. 34, fig. 12; 1936, p. 106.

Male. Length, 9.0 mm., ceph. 4.8 mm., abd. 4.1 mm.

Cephalothorax light brown, cephalic portion paler and separated from the thoracic by dark lines, thoracic with a pale median stripe to posterior margin, sides evenly rounded, moderately high, thoracic groove long; eyes, a.m.e. one-third the diameter of p.m.e., separated by a diameter, a.l.e. small, oblique and with p.m.e. forming a recurved row by their upper margins, p.m.e. and p.l.e. subequal and equi-

distant, p.m.e. separated by a radius, p.l.e. on black tubercles directed backward; quadrangle of median eyes as long as wide and much narrowed in front; clypeus as high as diameter of a.m.e. and probably in life, because a few remain, there is a row of stout spines on margin; mandibles verticle, pale brown, with darker stripes, covered with short white hairs and longer dark bristles, fang groove oblique, superior margin with three small teeth close together and a scopula of long white hairs, inferior margin with four teeth; labium as long as wide, lateral margins on basal half excavate; maxillae pale, more then twice as long as labium, slightly inclined, outer margins parallel; sternum pale, nearly as wide as long, (6 : 7), with scattered bristles; IV coxae separated by less than half a diameter; abdomen pale reddish-brown, with dark lateral stripes which end about the middle and are continued as spots, entire abdomen covered with short white and longer dark hairs, venter pale with irregular dark spots; legs, 4–1–2–3, pale, posterior tibiae and metatarsi darker, no scopula on tarsi; spines, I and II pairs, patella, 1–1, tibia, ventral, 2–2–2–2–2, lateral, 2–2, dorsal, 2, metatarsus, ventral, 2–2–2, lateral, 3, dorsal, 0, ventral spines on III and IV pairs very long and numerous; palpus about as long as cephalothorax, and seen from above, the patella and tibia are of equal length, tibia on prolateral side with a thick mass of short spines, tibial apophysis a black triangle almost at right angles to joint with a mass of white hairs below, cymbium, on prolateral margin, has a lobe which is parallel to tibial apophysis, palpus very similar to *Ctenus* with a large dark central lobe protruding from the plane.

Female. Length, 9.0 mm., ceph. 4.1 mm., abd. 4.5 mm.

Cephalothorax and eyes same as in male; spines on margin of clypeus missing; mandibles brown, geniculate at base, teeth on fang groove same as in male; abdomen has been injured so markings can not be seen; legs, 4–1–2–3, much shorter than in male; spines, I and II pairs, patella, 0, tibia, ventral, 2–2–2–2–2, lateral, 0, dorsal, 0, metatarsus, ventral, 2–2–2, lateral, 0, dorsal, 0; spines numerous and long on posterior tibiae and metatarsi; epigynum, wider than long, of the usual *Ctenoid* type, showing no detail but a small chitinized point each side near the fold.

Allotype ♂ Cuba; Trinidad Mountains, Buenos Aires, 2,500–3,500 feet, 8–14 May, 1936, (Darlington).

♂ ♀ Cuba; Trinidad Mountains, Buenos Aires, 2,500–3,500 feet, 8–14 May, 1936, (Darlington).

♀ Cuba; Pico Turquino, 6,000 feet, 16–17 June, 1936, (Darlington).

Franganillo has described two species and a variety of *Celaetycheus,*

all based on females. It is very doubtful if they belong to this genus as defined by Simon, since *C. cabriolatus* differs in the two characters that separate the genus from *Ctenus;* four instead of five teeth on the lower margin of the fang groove, and eyes of the posterior row equal, rather than p.m.e. larger than p.l.e. The number of spines on the anterior tibiae and metatarsi vary in the male and female as in *Ctenus.*

Genus Ctenus Walckenaer 1805.

Ctenus brevitarsus spec. nov.

Figures 159, 164

Male. Length, 11.0 mm., ceph. 6.5 mm., abd. 5.0 mm.

Cephalothorax chestnut-brown, pale V-shaped mark from p.l.e. to thoracic groove, sides covered with short white hairs, dense mass of white hairs behind posterior eye row; cephalic portion rises gently to thoracic groove where it is quite high and then falls abruptly to posterior margin, a thick mass of white hairs directly behind groove; eyes, a.m.e. about one-half diameter of p.m.e., separated by more than a radius, eyes of posterior row subequal and equidistant; p.m.e. separated by more than a radius, a.l.e. about one-half the size of a.m.e.; quadrangle of median eyes much narrower in front and as high as wide; clypeus a little more than diameter of a.m.e.; mandibles vertical, not swollen at base, with long colorless hairs, superior margin of fang groove with three teeth, middle one largest, scopula of very long hairs, inferior margin with five teeth, the last tooth very small; labium longer than wide, slightly excavate near base; maxillae more than twice as long as labium, twice as long as wide, sides almost parallel, tips convex, palpi inserted on basal third; sternum deep yellow, sparsely covered with bristles, two-thirds as wide as long, obtusely pointed at tip, IV coxae sub-contiguous; abdomen brown, covered with short hairs and longer dark bristles, a basal triangle of white hairs which gradually fades about the middle, posterior half with four pairs of poorly defined black spots, venter pale brown; legs, 4–1–2–3, pale brown with short white hairs, and short black hairs forming interrupted rings on femora, all tarsi less than half the length of metatarsi; spines, I and II tibia, ventral, 2–2–2–2–2, lateral, 2, dorsal, 3, metatarsus, ventral, 2–2–2, lateral, 3, dorsal, 0; palpus, femur with a transverse row of four spines near tip and a median row of three spines, patella longer than tibia, tibia with a broad truncate black apophysis, and a deep excavation on

dorsal side in which a broad flattened lobe of the cymbium rests, on ventral side is a short rounded apophysis which extends on tibia, palpal organ very similar to typical forms with a white or semi-transparent lobe above the middle.

Female. Length, 15.5 mm., ceph. 8.0 mm., abd. 8.0 mm.

Cephalothorax much redder than in the male, with a broad median pale stripe with converging margins which disappears at the thoracic groove, sides with short white hairs, a few white hairs about eyes, and a mass of white hairs posterior to thoracic groove, cephalic portion almost level from posterior eyes to groove when it slopes abruptly to posterior margin; eyes, a.m.e. about one-half diameter of p.m.e., separated by a diameter, posterior row, subequal, p.m.e. separated by a diameter, and from p.l.e. by a diameter and a half, a.l.e. nearer to p.l.e. than to p.m.e., anterior margin of a.l.e. and posterior margin of p.m.e. form a straight line; quadrangle of median eyes narrower in front and as high as wide; clypeus more than diameter of a.m.e.; mandibles dark brown, covered with long dark hairs, swollen at base, inferior margin with five unequal teeth, superior margin with three teeth, dense scopula of long hairs on upper margin; labrium brown, longer than wide, and deeply excavate on sides at base; maxillae more than twice as long as labium, wider at distal half so that outer margin is convex; sternum pale brown, flat, two-thirds as wide as long, obtusely pointed at tip, IV coxae almost touching; abdomen brown, covered with short black and white hairs, median pale stripe narrow at base and disappearing about the middle, posterior half with four pairs of dark spots, venter pale brown with scattered long hairs; legs, 4–1–2–3, brown, with short black and white hairs which form white rings on femora and tibiae, more conspicuous when dry, faint scopula on anterior tarsi and metatarsi, spines, I and II tibia, ventral, 2–2–2–2–2, lateral, 0, dorsal, 0, metatarsus, 2–2–2, lateral, 0, dorsal, 0; epigynum convex, broader than long with the lateral ridges very conspicuous.

Holotype ♂ Cuba; Guantanamo, 10 March, 1913, (Ramsden).

Allotype ♀ Cuba; Guantanamo, 10 March, 1913, (Ramsden).

Paratype ♀ Cuba; Guantanamo, 10 March, 1913, (Ramsden).

Paratype ♂ Cuba; Guantanamo, 12 April, 1913, (Ramsden).

Paratype ♀ Cuba; Soledad, February 1925, (Salt).

Paratype ♂ ♀ Cuba; Soledad, 12 August, 1931, (Worley).

Paratype ♂ Cuba; Trinidad Mountains, Mina Carlota, 19–25 March, 1925, (Salt and Myers).

Paratype ♀ Cuba; Trinidad Mountains, Mina Carlota, 8–14 May, 1936, (Darlington).

Paratype ♂ Cuba; Coast below Pico Turquino, June 1936, (Darlington).

When dry the abdomen is covered with a thick mass of yellowish-white hairs, so that the paired dark spots are not very distinct. The legs are also covered with whitish hairs. The female is redder than the male but differs from the male only in the characteristic points, no lateral or dorsal spines on the anterior tibiae, higher clypeus, slight differences in the eyes and the almost level cephalothorax. The epigynum is characteristic of the genus and differs from *Ctenus vernalis*, also from Soledad by the greater width and the heavier lateral pieces. The male differs from *C. vernalis* by the greater height of the cephalothorax and in the palpus by the shorter tibia; the lobe is much larger on the cymbium.

Ctenus coxanus spec. nov.

Figure 162

Male. Length, 10.0 mm., ceph. 5.5 mm., abd. 4.0 mm.

Cephalothorax bright chestnut-brown, a very faint median stripe from p.l.e. converging at posterior margin, anterior portion with fine white hairs, cephalic portion rising gradually to about the middle of the thoracic groove, when it falls abruptly to posterior margin; eyes, a.m.e. less than a radius apart, about one-half diameter of p.m.e., eyes of posterior row subequal, p.m.e. separated by less than a diameter and from p.l.e. by about a diameter and a half, p.l.e. on tubercles so that eyes are directed backward, second row straight, (center of p.m.e. on a straight line with center of a.l.e.); quadrangle of median eyes much narrower in front and higher than wide; clypeus about diameter of a.m.e.; mandibles vertical, with many white hairs, superior margin of fang groove with three teeth, inferior margin with five graduated teeth, scopula of long hairs on upper margin; labium longer than wide, lateral margins on basal half excavate; maxillae more than two and a half times as long as labium, sides parallel, tips not widened, palpi inserted about the middle; sternum yellow, three-quarters as wide as long, obtusely pointed at tip, IV coxae almost touching, coxae I, II and III covered with short, stiff spicules directed backward, each bearing a short bristle or hair, these less conspicuous on IV coxae; abdomen brownish-gray, covered with soft colorless hairs and stiff dark bristles, basal half with ill-defined median stripe, three pairs of dark spots on

posterior half, venter dull yellow with irregular dark spots; legs about the color of cephalothorax, all femora darker, length,

	femur	pat. + tib.	metat.	tarsus	total
I	4.5 mm.	7.0 mm.	4.5 mm.	2.0 mm.	18.0 mm.
II	4.0 mm.	5.5 mm.	3.5 mm.	1.8 mm.	14.8 mm.
III	3.0 mm.	4.2 mm.	3.0 mm.	1.5 mm.	11.7 mm.
IV	5.0 mm.	7.0 mm.	5.0 mm.	?	? 19.0 mm.

spines, all femora with long spines in three transverse rows, I and II pairs, patella, prolateral, 1, tibia, ventral, 2–2–2–2–2, middle pairs long, lateral, 3, dorsal, 3, metatarsus, ventral, 2–2–2, lateral, 3, dorsal, 0, spines on III and IV pairs very long; palpus, femur with 4 spines in a transverse row near apex and 2 median spines, tibia and patella of about equal length, tibia with 2 long lateral spines, and a large spreading black apophysis with a black swelling or knob beneath the palpal organ, parts of the palpus very black, a large dark area with a slender white lobe between it and the embolus.

Holotype ♂ Cuba; Pan de Azucar, Matanzas, 1913, (Barbour and Shaw).

This species differs from others in the great number of spicules on the coxae, and the short tibia of the palpus. The palpal organ is very similar to the figure of *Ctenus calcaratus* Cambridge, Biol. Centr. Amer., 1900, **2**, p. 113, pl. 8, fig. 7, but the tibial apophysis of the latter is much more slender; no mention is made of the spicules or bristles on the coxae, or the relative length of the tibia and patella of the palpus.

Ctenus isolatus spec. nov.

Figure 163

Female. Length, 18.0 mm., ceph. 9.0 mm., abd. 9.5 mm.

Cephalothorax deep red-brown with a paler median stripe from the posterior eye row to margin, soft white hairs over median stripe and a few white hairs about lateral margins, patch of white hairs behind p.l.e. continuing to clypeus; eyes, a.m.e. about one-half diameter of p.m.e., separated by a diameter, a.l.e. about one half the diameter of a.m.e. and midway between p.l.e. and p.m.e., posterior eyes subequal; p.m.e. separated by a scant diameter, and from p.l.e. by a diameter and a half, anterior margins of a.l.e. and p.m.e. form a slightly recurved line; quadrangle of median eyes narrower in front and wider than high; clypeus about equal to diameter of a.m.e.; mandibles dark brown, geniculate, superior margin of fang groove with three teeth

and many long hairs, inferior margin with five teeth; labium longer than wide, lateral margins at basal half excavate, rounded and slightly emarginate at tip; maxillae twice as long as labium, wider at distal half, outer margin convex; sternum flat, slightly pointed behind, sides emarginate, first coxae widely separated, fourth coxae touching; abdomen a faded brownish-gray with a wide median light stripe from base to spinnerets, posterior half with serrate margins, venter dull brown; legs, 4–1–2–3, a deep red-brown, no markings on anterior pairs but broken rings of white hairs on posterior femora, patellae, tibiae and metatarsi, spines, I and II pairs, tibia, ventral, 2–2–2–2–2, none overlapping, lateral, 0, dorsal, 0, metatarsus, 2–2–2, basal pair longest but not overlapping, lateral, 0, dorsal, 0, scopula quite heavy on metatarsi and tarsi; epigynum longer than wide, with conspicuous lateral margins and lateral chitinized points above the fold, middle area deeply depressed.

Holotype ♀ Cuba; Havana, (Barbour).

Paratypes 2 ♀ Cuba; Havana, (Cervera); Banks Coll.

Ctenus vernalis spec. nov.

Figures 150, 156, 158

Male. Length, 11.5 mm., ceph. 6.5 mm., abd. 6.0 mm.

Cephalothorax chestnut-brown with a median stripe from p.l.e. to posterior margin, sides veined with a dark brown, lateral margins with quite a wide border of soft white hairs, and a mass of white hairs behind p.l.e. which continues between eyes to margin of clypeus, cephalic portion rises gently to thoracic groove, then falls abruptly to the posterior margin; eyes, a.m.e. about half the diameter of p.m.e., separated by a radius, p.m.e. largest of the eight, separated by less than a diameter, and by about a diameter from p.l.e., a.l.e. about half a diameter of p.l.e. and midway between p.m.e. and p.l.e., seen from the front, the anterior margin of a.l.e. and p.m.e. form a straight line; quadrangle of median eyes much narrower in front and wider than high; clypeus less than diameter of a.m.e.; mandibles vertical, not geniculate, with two parallel dark lines and scattered long white hairs, superior margin of fang groove has a thick scopula so that teeth can not be seen, inferior margin has three large teeth followed by two much smaller; labium as long as wide, lateral margins at base excavate and tip slightly emarginate; maxillae more than twice as long as labium, tips not enlarged; sternum yellow, flat, oval, almost as wide as long, fourth coxae not quite touching, all coxae with a few spicules, most

numerous on second pair; abdomen with a wide median pale stripe that is more distinct on basal half, posterior half narrowed with irregular margins that suggest chevrons, sides gray, venter deep yellow with dark gray lines; legs, 4–1–2–3, pale brown with patches of dark hairs which form interrupted rings, spines, I and II pairs, tibia, ventral, 2–2–2–2–2, lateral, 3, dorsal, 3, metatarsus, ventral, 2–2–2, lateral, 2, dorsal, 0, scant scopula on tarsi and metatarsi; palpus, femur longer than patella plus tibia, with a transverse row of 4 spines near tip, and a median row of 4–6 spines, patella, 1 spine lateral, tibia and patella of equal length, tibia with 2 lateral and 1 dorsal spines, and a broad, short, black apophysis at tip, a prolateral brush of white hairs, cymbium extends over tip of tibia in a broad, flattened lobe with a sharp darkened margin, palpal organ characteristic of the genus with median dark piece not very large, and two white lobes above it.

Female. Length, 12.0 mm., ceph. 7.0 mm., abd. 6.0 mm.

Coloring same as in male, except that line of white hairs continues across the clypeus and half the length of the mandibles; eyes same as in male; clypeus less than diameter of a.m.e.; mandibles geniculate, superior margin of fang groove with three teeth, inferior with three large and two small teeth; maxillae slightly widened at distal half; labium and sternum same as in male; no spicules on coxae but there are long and short hairs; legs pale brown, the dark broken rings are more conspicuous on posterior femora, spines, long and scattered on femora, I and II pairs, tibia, ventral, 2–2–2–2–2, lateral, 0, dorsal, 0, metatarsus, ventral, 2–2–2, lateral, 0, dorsal, 0; epigynum broader than long as figured.

Holotype ♂ Cuba; Soledad, February, 1925, (Salt and Myers).

Allotype ♀ Cuba; Soledad, February, 1925, (Salt and Myers).

Paratype ♀ Cuba; Soledad, February, 1925, (Salt and Myers).

Paratype ♂ Cuba; Soledad, quarry, 13 August, 1931, (Worley).

Paratype ♀ Cuba; San Antonio de los Baños, 21 March, 1915, (Barbour and Brooks).

Genus Cupiennius Simon 1891

Cupiennius obscurus spec. nov.

Figures 136, 161

Male. Length, 16.0 mm., ceph. 8.0 mm., abd. 9.0 mm.

Cephalothorax pale brown, clothed with fine, soft white pubescence, black about eyes, median pale stripe to thoracic groove very faint,

thoracic groove long and deep; eyes, a.m.e. separated by less than a diameter, more than half the diameter of p.m.e., eyes of posterior row subequal, p.m.e. separated by less than a diameter and from p.l.e. by a diameter and a half, a.l.e. less than a radius of a.m.e. and slightly nearer p.m.e. than to p.l.e., seen from front, posterior margin of a.l.e. and anterior margin of p.m.e. form a straight line; quadrangle of median eyes narrower in front and as high as wide; clypeus equals diameter of a.m.e.; mandibles reddish-brown, vertical, not geniculate, with long white hairs arranged to show black lines, superior margin of fang groove with three teeth, inferior margin with four subequal teeth; labium yellow, longer than wide, lateral margins at basal half deeply excavate; maxillae yellow, twice as long as labium, outer margins parallel, slightly enlarged at tip; sternum yellow, almost as wide as long, tip prolonged in a round knob in front of fourth coxae; abdomen pale brown with a spear-shaped mark, outlined in faded black, extending to middle of the abdomen, posterior half with faint cross bars and many long white hairs, venter pale brown with four converging lines of dark spots; legs, 2–4–1–3, I pair, 39.0 mm. long, II pair, 42.0 mm. long, III pair, 30.0 mm. long, IV pair, 40.0 mm. long, pale brown with all tarsi and metatarsi darker, femora without dark spots or bands, spines, I and II pairs, tibia, ventral, 2–2–2–2, lateral, 2–2, dorsal, 0, metatarsus, ventral, 2–2–2 and 1 at apex; palpus, tibia as long as femur, tibial spur small, slender, dark and truncate, in the palpus the central unca has a sharp hook at one corner, and a blunt point at the opposite corner.

Female. Length, 17.0 mm., ceph. 8.0 mm., abd. 9.2 mm.

Cephalothorax pale brown with a median dark stripe covered with a pubescence of dark hairs, sides covered with short white hairs, black about the eyes, several long white filaments between the eyes, thoracic groove long; eyes, a.m.e. separated by a diameter, little more than a radius of p.m.e., p.m.e. separated by less than a diameter, and from the slightly smaller p.l.e. by a diameter and a half, a.l.e. one half the diameter of a.m.e. and nearer p.m.e. than to p.l.e., seen from the front, posterior margin of a.l.e. and anterior margin of p.m.e. form a straight line; quadrangle of median eyes narrower in front and as wide as high; clypeus vertical, equals about two diameters of a.m.e.; mandibles dark brown, slightly geniculate and covered with long hairs and bristles, superior margin of fang groove with three teeth, inferior margin with four teeth; labium brown, slightly wider than long, lateral margins at base deeply excavate, tip straight; maxillae dark brown, almost twice as long as labium, widened at tip; sternum yellow, about as wide as

long, and widest between second coxae, tip extends in a narrow point between fourth coxae; abdomen dark brown with two pairs of irregular patches of white hairs, the first about one third from base and the second about one third from tip, a pair of lateral stripes of white hairs, very faint from base to first pair of white spots, posterior half of abdomen has many very long white hairs or bristles, venter dark brown, when dry, a broad median stripe of short red-brown hairs from fold to spinnerets is conspicuous; legs, 1–2–4–3, brown, metatarsi and tarsi much darker, posterior pairs darker than anterior, anterior tibiae and metatarsi covered with white hairs, spines, I and II pairs, tibia, ventral, 2–2–2–2, lateral, 2–2, dense scopula on all tarsi and metatarsi; epigynum about twice as long as wide, very much broader than figures of *Cupiennius sallei* (Keys.) or *C. foliatus* Camb.

Holotype ♂ Cuba; Soledad, February 1925, (Salt and Myers).

Allotype ♀ Cuba; Soledad, Belmonte, 10 September, 1930, (Dow).

Paratype ♀ Cuba; Soledad, 30 August, with egg sac.

Paratype ♀ Cuba; south side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

This species is undoubtedly near *Cupiennius foliatus* Cambr., but differs in the dark tarsi and metatarsi, and the pointed hook on the central unca in the male palpus. It may prove to be one of the six species that Franganillo has described in the genus *Ctenus*, but his descriptions are so brief and lacking in specific characters that they can not be recognized. In the Zoöl. Jahrb. Abth. Syst., 1910, **28**, p. 425, Strand described *Cupiennius cubae* from a female. He does not mention the number of teeth on the fang groove of the mandibles, but the number of spines on the anterior tibiae, and the description of the epigynum are characteristic of the genus *Ctenus* rather than *Cupiennius*.

Cupiennius sallei (Keyserling)

Ctenus salei Keyserling, 1876, p. 685, pl. 8, fig. 53; Cambridge, Biol. Centr. Amer., 1901, **2**, p. 306, pl. 29, figs. 16, 17.

Keyserling described both sexes of this species from Mexico. F.O.P. Cambridge gives a detailed description, and figures both male and female in the Biologia. It has been found in Florida. Petrunkevitch did not find it in Puerto Rico. Males have been found at Soledad and Santiago de las Vegas.

Family GNAPHOSIDAE

Sub-family ANAGRAPHIDINAE

Genus PARATHEUMA gen. nov.

Cephalothorax moderately convex, anterior margin truncate, sides rounded, thoracic groove short but distinct; eyes cover half of head, anterior row slightly recurved, subequal, posterior row straight, p.m.e. nearer p.l.e. than to each other; clypeus narrow; labium as long as wide, lateral margins notched at base; mandibles swollen at base, divergent in female, superior margin of fang groove with three teeth, inferior margin with five or six minute teeth; maxillae almost twice as long as labium, very slightly inclined, slightly impressed in female, tips oblique, scopulate; spinnerets, inferior pair separated by a diameter or more, basal joint long, terminal joint short and conical, median pair as long as inferior, superior pair as widely separated as inferior, basal joint as long, terminal joint nearly as long as basal and pointed; colulus wanting; lobe of spiracle directly anterior to spinnerets; legs, coxae long, I pair of legs longest, anterior tibiae and metatarsi with small spines and few hairs, legs not scopulate.

Type *Paratheuma insulana* (Banks).

In 1928, Petrunkevitch placed all Drassids with long spinnerets together under the sub-family *Anagraphidinae*. *Paratheuma* differs from any described, in the curvature of the eye rows, number of teeth on the fang groove, and the lack of scopula on tarsi and metatarsi. In 1891, Keyserling established the genus *Radulphius* for two species from Brazil, which also have swollen mandibles, but the spinnerets are not described as separated, and the genus was placed near *Chiracanthium*.

PARATHEUMA INSULANA (Banks)

Figure 148

Eutichurus insulanus Banks, 1902, p. 270, fig. 3.

Female. Length, 4.5 mm., ceph. 2.0 mm., abd. 2.4 mm.

Cephalothorax moderately convex, more than three-quarters as wide as long, slightly narrowed in front of I coxae, sides rounded, anterior margin truncate, thoracic groove distinct; eyes cover middle of head, anterior row very lightly recurved, eyes subequal and equidistant, a.m.e. dark, separated by about a radius, posterior row a little longer than anterior, straight, and subequal, p.m.e. separated by more than a diameter and from p.l.e. by less, lateral eyes separated by less than a radius; quadrangle of median eyes narrower in front and higher

than wide; clypeus less than diameter of a.m.e.; mandibles much swollen at base, more than half the length of cephalothorax and divergent, fang groove oblique, superior margin with three teeth, inferior margin with six very small teeth or granules, fang long and evenly curved; labrium as long as wide, tip rebordered, lateral margins at base notched; maxillae nearly twice as long as labium, parallel and lightly impressed, palpi inserted from basal third; sternum heart-shaped, as long as wide, IV coxae separated by a diameter; abdomen grayish-brown, basal half with a thin covering of short hairs, oval, two-thirds as wide as long, dorsum rather flat, venter paler, spinnerets, inferior pair separated by more than a diameter, basal joint long, terminal joint short and conical, middle pair as long as inferior, superior pair, basal joint as long as inferior, and terminal joint about the same length, and pointed; legs, III and IV left missing, 1–2–4–3, same color as cephalothorax, with few hairs and no scopula on metatarsi and tarsi, spines I and II pairs, femur, dorsal, 1–1 about middle, patella, 0, tibia, ventral, 2–2, lateral, 1, metatarsus, ventral, 2–2, lateral, 0; epigynum, two oval openings, oblique, with heavily chitinized margins, separated by less than the long diameter.

♀ Cuba; Santiago de las Vegas, (Horne and House), Banks Coll.

This species was described in 1902 from a female from Bermuda, which is slightly larger than the Cuban specimen. A year later, Mr. Banks reported the same species from Haiti. Because of the widely separated spinnerets, the lightly impressed maxillae, and the thoracic groove, it can not be placed in the genus *Eutichurus*.

Paratheuma isolata spec. nov.

Figure 170

Male. Length, 6.5 mm., ceph. 3.0 mm., abd. 3.5 mm.

Cephalothorax chestnut-brown, moderately convex, two-thirds as wide as long, sides evenly rounded, with a fringe of long hairs directed forward on posterior lateral margins, anterior margin truncate, thoracic groove long and distinct; eyes cover middle half of head, probably because of injury, the left p.m.e. is missing, anterior row slightly recurved, eyes equidistant, a.m.e. largest of eight, separated by less than a radius, posterior row same length as anterior, slightly procurved, left p.l.e. smaller than right p.l.e., lateral eyes separated by less than a radius; quadrangle of median eyes same width in front as behind; clypeus about radius of a.m.e.; mandibles geniculate, vertical, brown,

median area covered with long dark bristles, superior margin of fang groove has three teeth, middle the largest, inferior margin has two widely separated teeth; labium as long as wide, tip rebordered, lateral margins at basal third deeply excavate, maxillae about twice as long as labium, plainly impressed, palpi inserted about middle and distal half distinctly narrowed; sternum pale brown, two-thirds as wide as long, pointed between IV coxae, which are separated by half a diameter; abdomen cylindrical, twice as long as wide, with a slightly darker basal mark extending beyond the middle, followed by five pairs of dark gray diagonal bars which could almost be called chevrons, sides gray, venter much paler; spinnerets, inferior pair long, separated by half a diameter, terminal joint conical, superior pair, basal joint same length, terminal joint as long as basal, and pointed, median pair hidden by inferior pair but as long as others; legs, much broken and rubbed, 4–1–2–3, pale brown, scant scopula on all tarsi, few hairs and spines, I and II pairs, patella, 0, tibia, ventral, 2–2–2, lateral, 0, metatarsus, ventral, 1–1, lateral, 0; palpus, tibia longer than patella and almost twice as long as terminal joint, tibial apophysis not as long as diameter of joint, flattened laterally, with a sharp black tip and serrate margins, palpal organ very simple and of the typical *Gnaphosid* type, embolus a very slender tube, starting from the base, following the contour of the cavity and ending with an abrupt turn at tip, conductor a slender ribbon-like piece from near the middle of the palpus, parallel to embolus, and protruding from the plane of the palpus.

Holotype ♂ Cuba; Isle of Pines, 1918, (Barbour and Brooks).

This species undoubtedly belongs near *Syrisca hirsuta* Petrunkevitch from Panama, and both should be placed in the *Gnaphosiae* because of the separated spinnerets and the impressed maxillae; these two characters are found only in that family. The generic position is not certain, and it is possible that *isolata* does not belong in *Paratheuma* because of the vertical mandibles, fewer teeth on fang groove, and light scopula on the tarsi.

Sub-family GNAPHOSINAE

Genus Gnaphosa Latreille 1804

Gnaphosa sericata (L. Koch)

Pythonissa sericata L. Koch, 1866, p. 31, pl. 2, fig. 21.
Herpyllus bicolor Hentz, 1847, p. 456, pl. 24, fig. 4.

Gnaphosa spiralis F.O.P. Cambridge, 1899, p. 55, pl. 4, fig. 18.
Gnaphosa simplex Franganillo, 1926, p. 49.

A common species in the southern United States as far north as New York. The male palpus is much more complicated than is usual in the Gnaphosidae.

♀ Cuba; Soledad, 7 August, 1931, (Worley).

Sub-family DRASSODINAE

Genus Eilicina gen. nov.

Cephalothorax slender, not very convex, thoracic groove short; anterior row of eyes slightly recurved, a.m.e. largest of the eight and separated from a.l.e. by a line, eyes of posterior row well separated from anterior, almost straight, p.m.e. elliptical and oblique; clypeus about equal to diameter of a.m.e.; mandibles attenuate, inferior margin with carina, fang short; maxillae twice as long as wide, only slightly inclined towards labium, with tips widened; labium longer than wide with tip rounded; sternum oval, and prolonged in a point between fourth coxae; inferior spinnerets separated by a diameter; no dorsal spine on fourth tibia.

Type *Eilicina cincta* (Banks)

The genus differs from *Eilica* in the wider maxillae, and the eyes; from *Callilepis* by the short thoracic groove, the carina on the fang groove, and the eyes.

Eilicina cincta (Banks)

Figures 168, 172

Eilica cincta Banks, 1909, p. 157, pl. 45, fig. 8.

Female. Length, 4.3 mm., ceph. 2.0 mm., abd. 2.7 mm.

Cephalothorax golden-yellow, slightly darker about sides, two-thirds as wide as long, anterior margin one half the greatest width, thoracic groove short and rather deep; eyes occupy the middle half of the head, anterior row slightly recurved, a.m.e. dark, largest of the eight, separated by half a diameter, and from a.l.e. by a line, posterior row a little longer than anterior row and almost straight, a.m.e. and p.m.e. separated by almost two diameters of a.m.e., p.m.e. oval, separated by a little more than their long diameter, p.l.e. almost as large as a.m.e., lateral eyes separated by diameter of p.l.e.; quadrangle

of median eyes higher than wide and slightly narrower in front; clypeus low, about equal to diameter of a.m.e.; mandibles slightly attenuate, with scattered long hairs, median margin with darkened ridge, inferior margin of fang groove has a slight carina with a darkened edge the entire length, fang short and weak; labium longer than wide, tip rebordered; maxillae not twice as long as labium, slightly arcuate, tips broadened so that margin is circular, deeply impressed; sternum a deep yellow, two-thirds as wide as long, widest between II and III coxae, IV coxae separated by a diameter; abdomen dull gray, basal portion paler with a broad whitish bar across the middle, twice as long as wide, cylindrical, venter pale gray; spinnerets, inferior pair separated by more than a diameter, terminal joint of superior pair quite short; legs, all left legs, and I right missing, about the same color as the cephalothorax, spines, II femur, dorsal, 3 long spines, tibia not twice as long as patella, dorsal, 0, ventral, 1 at apex, 1 middle, metatarsus, 0, no spine above on IV tibia; epigynum shows two circular sacs below the skin, almost touching, each connected with a small black circle that may be the opening.

Holotype ♀ Cuba; Havana, (Baker), Banks Coll.

Eilicina elegans spec. nov.

Figures 165, 169

Female. Length, 3. 1 mm., ceph. 1.6 mm., abd. 1.8 mm.

Cephalothorax pale brown, faintly veined with black, most so anterior to the thoracic groove, anterior margin two-fifths greatest width, rather flat, thoracic groove short; eyes, anterior row straight, a.m.e. round, diurnal, separated by more than a radius, and touching smaller a.l.e., posterior row same length as anterior, slightly procurved, p.m.e. ellipical, oblique and touching, largest of the eight, almost touching p.l.e., lateral eyes subequal, separated by less than a radius, area between rows black; quadrangle of median eyes same width in front as behind, higher than wide; clypeus less than diameter of a.m.e.; mandibles vertical, attenuate with a long, strong black bristle on inner margin which interlaces, fang groove oblique, rather short, three teeth on superior margin; labium longer than wide; maxillae strongly impressed, slightly inclined over labium, palpi inserted below the middle; sternum pale, convex with strong bristles about margin, almost as wide as long, (4.5 : 5.5), IV coxae separated by a diameter; abdomen oval, more than twice as long as wide, dull

olive-brown, covered with long hairs and iridescent scales, venter paler with no scales, inferior spinnerets separated by more than a diameter; legs, I and II right and I and IV left missing, same color as cephalothorax, spines, II tibia, ventral, 1 slender pair at tip, metatarsus, ventral, 1 pair at base, IV tibia no dorsal spines, III metatarsus, distinct preening comb at tip; epigynum about twice as long as wide, openings probably at anterior end, just above the fold is a pair of clear ovals almost touching.

Holotype ♀ Cuba; Maisi, 15, 16 July, 1936, (Darlington).

Eilieina elegans does not have the carina on the inferior margin of the fang groove as does *E. cineta* (Banks), but the eyes are very similar. *Callilepis insularis* Banks is much larger, but the eyes are very similar and the epigynum is on the same plan. It also has three teeth on the superior margin of the fang groove.

Genus Caridrassus gen. nov.

Cephalothorax very slender, moderately convex; anterior margin not much narrowed, no thoracic groove; eyes, anterior row procurved, a.m.e. smaller than a.l.e., posterior row recurved, longer than anterior row, p.m.e. elliptical and oblique; mandibles small, margins of fang groove can not be seen, fang short; labium longer than wide; maxillae two and a half times as long as wide, sides almost parallel, tip not enlarged, and only slightly inclined towards labium; sternum oval and prolonged in a point between IV coxae; spines on legs same as in *Sergiolus*.

Type *Caridrassus wheeleri* spec. nov.

The genus is probably more closely related to *Echenus* than to *Sergiolus*, but the maxillae are not curved at the tip, and the posterior eye row is recurved.

Caridrassus wheeleri spec. nov.

Figures 166, 167

Female. Length, 3.5 mm., ceph. 1.2 mm., abd. 2.2. mm.

Cephalothorax dark brown, black between the eye rows, moderately convex, nearly twice as long as wide, no thoracic groove; eyes, anterior row procurved, a.m.e. smallest of the eight, separated by about a diameter and about the same distance from a.l.e., posterior row longer than anterior, slightly recurved, p.m.e. elliptical and oblique, separated

by a little more than their long diameter, p.l.e. and a.l.e. subequal, and separated by their diameter; quadrangle of median eyes narrower in front and as high as width between p.m.e.; clypeus equals diameter of a.l.e., a pair of very long bristles on the margin; mandibles small, brown, vertical, slightly swollen at base, median margin excavate with a row of stiff hairs, margins of fang groove impossible to see; labium pale brown, one and a half times as long as wide; maxillae pale, one and a half times as long as labium, slightly arcuate, tip not enlarged, slightly inclined over labium, palpi inserted at basal third; sternum slightly convex, two-thirds as wide as long, ending in a point between IV coxae, IV coxae separated by a diameter; abdomen more than twice as long as wide, with a broad dark median stripe from base to tip, widest above spinnerets, pale area each side extends two-thirds length of abdomen, sides dark, dark area with small iridescent scales, venter pale, spinnerets, inferior pair separated by diameter, tip bilobed with smaller lobe on inner side; coxae and trochanters pale yellow, legs much broken, femora dark brown, patellae dark at tip, other joints pale, posterior tibiae dark with lateral stripes, spines, I and II pairs, tibia, 1 or 2 ventral near tip, metatarsus, ventral, 1–1 at tip, all very slender, no dorsal spines on tibiae III and IV; epigynum, two circular openings separated by a diameter and a half, these are superimposed on round dark sacs, in anterior portion there are two dark masses of twisted and coiled tubes.

Holotype ♀ Cuba; Cienaga de Zapata, February, 1913 (Wheeler).

This species while small, is very strikingly marked. The small lobe at the tip of the inferior spinneret is found in the genus *Theuma* of the Gnaphosidae, and in *Zimiris* of the Prodidomidae. The species is named for the late Dr. W. M. Wheeler who studied spiders many years ago.

Genus Litopyllus Chamberlin 1922

Litopyllus inconspicuus spec. nov.

Figure 176

Female. Length, 3.5 mm., ceph. 1.6 mm., abd. 2.1 mm.

Cephalothorax bright brown, scantily covered with fine hairs, rather low, two-thirds as wide as long, anterior margin a little more than half the greatest width, thoracic groove short but distinct; eyes closely grouped, covering two-thirds of head, anterior row procurved, a.m.e. largest of the eight, almost touching and touching a.l.e., posterior row

same length as anterior and slightly more procurved, p.m.e. triangular, oblique, separated by less than short diameter and almost touching p.l.e., lateral eyes touching; quadrangle same width in front as behind, higher than wide; clypeus less than diameter of a.m.e.; mandibles brown, vertical, fang groove oblique, superior margin with one tooth, inferior margin with one very small tooth; labium as long as wide, tip narrowed; maxillae twice as long as labium, distinctly impressed, and only slightly inclined over labium, upper margin with a black carina; sternum pale brown, slightly convex, oval, two-thirds as wide as long, IV coxae separated by less than a diameter; abdomen pale, thickly covered with long, fine hairs, oval, two-thirds as wide as long, venter same color, spinnerets, inferior pair separated by almost two diameters; legs, 4–1–2–3, pale brown, covered with fine hairs, spines, I pair, femur, dorsal, 1–1–1, patella, 0, tibia, O, metatarsus, O, II pair same as I pair, III pair, femur, dorsal, 1–1–1, patella, 2, tibia, dorsal, 1, lateral, 2, ventral, 2–2–1, metatarsus, dorsal and ventral spines not paired, IV pair, femur, dorsal, 1–1–1, patella, 2, tibia, dorsal, 0, ventral, 2–2–2, lateral, 3, metatarsus, not paired; epigynum, a transverse oval depression with the anterior margins heavily chitinized and fringed with long hairs, between depression and the fold, is a pair of dark circular sacs beneath the skin that are separated by less than a diameter.

Holotype ♀ Cuba; Soledad, April 1936, (Darlington).

The genus *Litopyllus* originally included three species. It is closely related to *Herpyllus*, but is separated by the larger posterior median eyes that are close together. The Cuban species is much smaller than any described, but it agrees with others in the size and the position of the eyes, and the dorsal spine on the third tibia.

Genus Paramyrmecion gen. nov.

Cephalothorax moderately convex, anterior margin narrowed to less than half the greatest width, thoracic groove distinct; eyes, anterior row straight, a.m.e. diurnal, larger than a.l.e., posterior row same length as anterior row, plainly procurved, p.m.e. oval, nearer p.l.e. than to each other; quadrangle higher than wide; mandibles vertical, no teeth on either margin of fang groove; first tibia with one small ventral spine at tip; third tibia with one dorsal spine at base and lateral spines.

Type *Paramyrmecion cubanum* spec. nov.

This genus agrees with *Megamyrmecion* in the lack of teeth on the inferior margin of the fang groove, but differs in the slightly procurved posterior eye row, no teeth on the superior margin of the fang groove, and in the few spines on the anterior legs.

Paramyrmecion cubanum spec. nov.

Figures 173, 175

Female. Length, 5.5 mm., ceph. 2.0 mm., abd. 3.3 mm.

Cephalothorax deep yellow, with inconspicuous hairs on the sides, moderately convex, head narrowed to less than half the greatest width, thoracic groove distinct; eyes, covering a little more than half the width of head, anterior row straight, a.m.e. diurnal, largest of the eight, separated by a little more than a radius and almost touching a.l.e., posterior row same length as anterior, procurved, p.m.e. oval, separated by their short diameter and from p.l.e. by less, p.l.e. triangular, separated from a.l.e. by less than half a diameter; quadrangle of median eyes higher than wide, width same in front as behind; clypeus little more than diameter of a.m.e.; mandibles pale brown, small, vertical, fang groove short with no teeth on either margin, no scopula; labium longer than wide, lateral margins on basal third notched; maxillae brown, one and a half times as long as labium, inclined over labium, with black keel on upper margin, emarginate on outer side, palpi inserted about middle; sternum yellow, oval, widest between second coxae, posterior sides very hairy and ending in a hairy point in front of IV of coxae, IV coxae separated by less than half a diameter; abdomen pale yellowish-gray, about twice as long as wide, with a few long hairs, venter pale, inferior spinnerets separated by a diameter; legs, 4–1–2–3, pale yellow, I and II left legs missing, scopula on anterior tarsi and metatarsi, spines, I pair, femur, dorsal, 1 about middle, tibia, ventral, 1 very small at tip, metatarsus, ventral, 1 very small at base, II pair, femur, dorsal, 1 basal, tibia, ventral, 1 about middle, 1 at tip, metatarsus, 0, III pair, tibia, dorsal, 1–1,; epigynum, openings a pair of small round depressions separated by a broad median septum which widens near fold, on each side are two circular dark bodies beneath the skin.

Holotype ♀ Cuba; Soledad, 12 August, 1931, (Banks).

This species differs from others in the lack of teeth on the fang groove, the procurved posterior eye row, the thoracic groove, and in the few spines on the anterior legs.

Genus Poecilochroa Westring 1874

Poecilochroa minuta Banks

Figure 171

Poecilochroa minuta Banks, 1898, p. 185.

Male. Length, 4.0 mm., ceph. 1.9 mm., abd. 2.2 mm.

Cephalothorax dark chestnut-brown, middle area paler, black in eye area, a few white hairs on sides, anterior margin less than half the greatest width, thoracic groove short and inconspicuous; eye area covers two-thirds width of head, anterior row of eyes recurved, eyes subequal, a.m.e. separated by a diameter and almost touching a.l.e., posterior row slightly longer than anterior and very slightly recurved, p.m.e. largest of the eight, a broad oval, slightly oblique, separated by one and a half long diameters and from p.l.e. by a short diameter, lateral eyes separated by more than diameter of a.l.e.; quadrangle of median eyes higher than wide and narrower in front; clypeus vertical, equal to a little more than diameter of a.m.e.; mandibles dark brown, vertical, fang groove short with no tooth or plate on inferior margin; labium longer than wide; maxillae dark brown, twice as long as labium, sides parallel, tip truncate with a black keel, deeply impressed; sternum brown, darker on margins, oval, two-thirds as wide as long, widest between second coxae, fourth coxae separated by half a diameter; abdomen darker than cephalothorax, dorsal scutum at base covering two-thirds of abdomen, sides with white hairs, iridescent, venter pale brown, inferior spinnerets separated by more than a diameter; legs, I coxae darkest, others bright yellow, all femora dark, other joints pale yellow, hairy, scant scopula on anterior tibiae and metatarsi, long spines on dorsal side of femora, I and II pairs, tibia, ventral, 1–1 at tip, metatarsus, ventral, 1–1, at base, III tibia, dorsal, 1 median; palpus, patella and tibia of equal length, tibial apophysis long, flattened and almost reaching middle of tarsus, palpal organ voluminous, embolus a short stiff point at tip.

♂ Cuba; Soledad, sweeping, 16 August, 1931, (Worley)

The type of *Poecilochroa minuta*, from Brazos Co., Texas, is in the N. Banks Collection. It is in very bad condition and one palpus and abdomen is missing. It is more hairy than the Cuban specimen and very much faded from age. In the original description, no mention is made of the dorsal scutum, but this may vary in size and color and could be easily overlooked. The palpi, however, are alike in all de-

tails. The Cuban specimen was taken by sweeping, and it is not unlikely that the species lives with ants and resembles its host in size and color.

Genus Teminius Keyserling 1887

Teminius clarissa (Franganillo)

Syrisca clarissa Franganillo, 1926, p. 60; id., 1936, p. 122.

Female. Length, 12.0 mm., ceph. 5.5 mm., long, 4.0 mm. wide, ant. margin, 3.0 mm., abd. 6.7 mm.

Cephalothorax pale brown, thickly covered with fine black hairs and bristles, moderately convex, sides rounded, thoracic groove distinct; eyes cover half of head, anterior row straight, a.m.e. slightly largest of eight, separated by more than a radius and from a.l.e. by a radius, posterior row little longer than anterior, eyes subequal and equidistant, separated by a diameter and a half, lateral eyes separated by about a diameter of p.l.e.; quadrangle of median eyes slightly wider in front and about as high as wide; clypeus a little less than diameter of a.m.e.; mandibles reddish-brown, strongly geniculate at base and covered with long black hairs, superior margin of fang groove has three teeth of which the middle is the largest, inferior margin with two well separated teeth, scopula on superior margin only, fang long and curved; labium reddish-brown, longer than wide, lateral margins at basal third deeply excavate, tip rebordered; maxillae brown, twice as long as labium, tip oblique and scopulate, lightly impressed, palpi inserted about the middle; sternum oval, widest between second coxae, rounded at tip, fourth coxae separated by less than a diameter; abdomen dark gray with a wide median stripe pale stripe from base to middle, indistinct broken chevrons on posterior half, venter pale; spinnerets, inferior pair separated by a diameter, basal joint thick, terminal joint short and conical, median pair very thick, superior pair, basal joint as long as inferior, terminal joint equally long and pointed; legs, 4–1–2–3, pale yellow, heavily coated with fine black hairs; legs rather short, anterior tarsi and metatarsi densely scopulate to base, posterior pairs not as heavily scopulate, spines, I pair, femur, dorsal, 2 or 3 long spines, patella, 0, tibia, ventral, 1–1 long, slender spines easily overlooked in the dark hairs, lateral, 0, metatarsus, 0, posterior tibiae, several dorsal spines, ventral, 2–2–2; epigynum similar to figures of *Syrisca pulchra* Petr. and *Syrisca keyserlingi* Simon.

♀ Cuba; Siboney, 1915, (Rodriguez).
♀ Cuba; Havana, *Teminius insularis* Banks, nec Keyserling.
♀ Cuba; Santiago de las Vegas, *Teminius insularis* Banks.
♀ Cuba; San Antonio de los Baños, 21 March, 1915, (Barbour).
4 ♀ Cuba; Havana, 12 June, (Baker), Banks Coll.

The Cuban specimens are probably *Syrisca clarissa* Franganillo, although they differ a little from his very brief description. The anterior tibiae are described as spineless but in all specimens seen, there are two long slender spines easily confused with black hairs. It differs from *Syrisca pulchra* Petr. from Panama and Puerto Rico by the position of the p.m.e. In the Cuban species the p.m.e are separated by a diameter and a half, and in the species from Puerto Rico by one diameter. This species also has no spines beneath an anterior tibiae. *Teminius insularis* Keyserling from Haiti, the type of which is now before me, also has the p.m.e. separated by a diameter, the cephalothorax is much narrowed in front, and the anterior tibiae are spineless. In all three species, the epigynum is very similar but the type of *T. insularis* may be one moult from maturity. The same may be true of the specimens figured as *Syrisca hirsuta* Petr., Spiders from Panama, Trans. Conn. Acad., 1925, **27**, p. 151, fig. 76. It is possible that *Syrisca pulchra* Petr., figured from Puerto Rico, is *Teminius insularis* Keys. Until males are known of the various species, they can not be definitely separated.

Keyserling, in his description of the genus *Teminius*, definitely states that the maxillae have a diagonal impression and the genus is placed in the Drassidae. The genotype, *Teminius insularis*, is from Haiti and the inferior spinnerets are separated by fully a diameter. These two characters are confined to the Gnaphosidae. In 1897, in the Hist. Nat. Araignèes, Simon treats *Teminius* Keys. as a possible synonym of *Syrisca*. The type of *Syrisca* is from Senegal, and probably belongs to the Clubionidae.

Family SPARASSIDAE

Sub-family SPARIANTHIDINAE

Genus Pseudosparianthis Simon 1887

Pseudosparianthis cubana Banks

Pseudosparianthis cubana Banks, 1909, p. 165, pl. 45, fig. 4; Bryant, 1933, p. 192.

Tentabunda cubana Fox, 1937, p. 464, figs. 5, 11.

Female. Length, 10.0 mm., without mandibles or spinnerets, ceph. 4.2 mm., abd. 6.0 mm.

Cephalothorax yellowish-brown, with many stiff black hairs or bristles, thoracic groove wanting; eyes, anterior row straight, a.m.e. largest of the eight, separated by more than a diameter and from a.l.e. by a diameter and a half, posterior row a little longer than anterior, procurved, eyes subequal and almost equidistant, lateral eyes subequal and separated by a diameter; quadrangle of median eyes narrower in front and wider than high; clypeus less than diameter of a.m.e.; mandibles reddish-brown with many long stiff bristles, superior margin of fang groove with three large teeth on left, and three large and one small on right mandible, inferior margin with six minute teeth; labium wider than long, lateral margins slightly excavate at base, tip straight; maxillae much wider at tip than at base, more than twice as long as labium; sternum yellowish, triangular, almost as wide as long, fourth coxae separated by less than half a diameter; abdomen grayish yellow with irregular black spots most numerous on posterior half where they form chevrons, venter pale with dark spots on sides and near spinnerets; spinnerets on a common basal segment; legs, 4–1–2–3, golden-brown, spines, I and II pairs, tibia, ventral, 2–2, 1 prolateral at tip, dorsal, 0, metatarsus, ventral, 1–1 about one-third from base, I and II metatarsi heavily scopulate, III and IV metatarsi with a cluster of small curved spines or bristles at center of apex beneath; epigynum a broad ellipse a diameter and a half from the fold, with a heavily chitinized margin and a faint median septum, posterior are a pair of dark sacs beneath the skin separated by a narrow slit.

Holotype ♀ Cuba; Havana, (Baker), Banks Coll.

Paratype ♀ Cuba; Santiago de las Vegas, beneath a leaf, 25 October, 1908, (Houser), Banks Col.

2 ♀ Cuba; Soledad, garden from dead banana leaves, 8 August, 1931, (Worley).

Simon founded the genus *Pseudosparianthis* on two species from the Amazon. Later he described another species from St. Vincent. In 1900, F. O. P. Cambridge reported a fourth species from Mexico, stating that eventually it would be necessary to modify the genus as he found the number of teeth on both margins of the fang groove to be variable. *P. cubana* is nearer to *Pseudosparianthis* than to *Stasina*.

It is possible that the genus *Decaphora* Franganillo is a synonym, although the original description states there are five strong teeth on the superior margin of the fang groove and five small ones on the inferior margin. The only species in the genus *Decaphora* is from Sierra

de Rangel, which is not far from the type locality of *Pseudosparianthis cubana*. The number of teeth on the fang groove varies in immature and adult specimens. Among the numerous half grown females, many have five teeth on the superior margin and six very small ones in the inferior.

In 1937, Irving Fox described the genus *Tentabunda* for *Pseudosparianthis cubana* because it has one pair of spines beneath on the anterior metatarsi, separating it from true *Pseudosparianthis* which has two pairs. He describes for the first time the male from a specimen found at Coronado Beach, Volusia Co., Florida.

Genus Stasina Simon 1877

Stasina lucasi spec. nov.

Figures 179, 182

Female. Length, 8.0 mm., ceph. 4.0 mm. long, 3.5 mm. wide, abd. 5.0 mm.

Cephalothorax bright yellow, covered with dark hairs which are longer and heavier on the cephalic portion, thoracic groove short, cephalic portion slopes gradually to groove, then abruptly to posterior margin, lateral striae meet in front of groove; eyes cover two-thirds of width of anterior margin, anterior row very slightly procurved, equidistant, a.m.e. slightly largest of eight, separated by about a diameter, posterior row procured, a little longer than anterior, eyes subequal and equidistant, lateral eyes separated by little more than a radius; quadrangle of median eyes narrower in front and wider than high; clypeus less than a diameter of a.m.e.; mandibles vertical, somewhat swollen, covered with short black hairs in rows, boss very small, fang groove oblique, superior margin with three teeth, first two subequal and third much smaller, scopula from teeth to base of fang, interior margin with two minute teeth widely separated, fang with a thick base and evenly curved; labium wider than long, lateral margins at basal third excavate; maxillae more than twice as long as labium, sides parallel; sternum pale, shield-shape, nearly as wide as long, ending in a hairy knob in front of fourth coxae, which are separated by half a diameter; abdomen brown, covered with dark marks arranged in longitudinal lines on basal half so as to leave a pair of pale median stripes, and on posterior half forming indistinct chevrons, venter with dark spots in lines; spinnerets closely grouped on a cylindrical base which is separated from

the abdomen by a membrane; legs, 2–4–1–3, not varying greatly in length, yellow, with anterior tarsi and metatarsi darker, anterior metatarsi and tarsi with a dense irridescent scopula which is missing on IV and much reduced on the III metatarsi, spines, no spine on patellae, I and II pairs, tibia, ventral, 2–2–2, very long and overlapping, followed by 3 very slender curved spines, lateral, O, dorsal, O, metatarsus, ventral, 1–1 basal, very long, lateral, O, dorsal, O, epigynum a rectangular area with a rounded lip on posterior margin, center filled with a white substance, anterior are two reddish-brown pear-shaped sacs beneath the skin, separated by their diameter.

Male. Length, 6.0 mm., cepth. 3.0 mm. long, 2.8 mm. wide, abd. 3.0 mm.

Cephalothorax pale yellow, shaded with dark brown, showing dark anterior radial striae, black hairs much smaller than on female and head more narrowed; eyes and clypeus same as in female; mandibles smaller, boss very small, superior margin of fang groove with two teeth on right mandible and three on left, inferior margin the two small teeth small teeth reduced to granules; labium, maxillae and sternum same as in female; abdomen with dark spots arranged in lines; legs longer than in female, spines, no spines on patellae, I and II pairs, tibia, ventral, 2–2–2, long and overlapping, 1 small, prolateral spine opposite basal pair, lateral, 2–2, dorsal, 1 median near tip, metatarsus, ventral, 2 basal, lateral, 1–1, scopula not as heavy on anterior tarsi and metatarsi as in female and almost wanting on III metatarsus; palpus as long as cephalothorax, tibia and patella of equal length, tibia with a large prolateral basal spine, on dorsal side a dark apophysis which interlocks with lobe on cymbium, terminal joint large, three quarters as wide as long, bulb produced in a narrow lobe which projects beyond the cymbium and rests on the tibia and evidently interlocks with a dark tibial apophysis, embolus arises at inner margin about the middle, follows the contour of cavity and ends about opposite origin, above the tip of the embolus and at one side is a dark hook with a broad base which projects from the plane of the palpus and in the middle between embolus and hook are two soft white structures, one a slender twisted filament ending on margin near the middle of the cavity and the other a broad lobe, cymbium covered with short hairs.

Holotype ♂ Cuba; Oriente, Sierra de Cobre, 3,000–3,800 feet, 3–7 July, 1936, (Darlington).

Allotype ♀ Cuba; Oriente, South side Pico Turquino, 3,000–5,000 feet, June 1936, (Darlington).

Stasina macleayi spec. nov.

Figures 174, 180

Female, Length, 10.2 mm., ceph. 4.1 mm., abd. 6.2 mm. long, 4.1 mm. wide.

Cephalothorax pale with many dark hairs and dark lines and with hairs radiating from the thoracic groove; eyes, anterior row slightly procurved, eyes subequal, a.m.e. slightly nearer each other than to a.l.e., posterior row slightly longer, eyes equidistant, p.m.e. smaller than p.l.e. or a.m.e.; quadrangle of median eyes narrower in front and wider than high; clypeus as high as a.m.e.; mandibles pale, covered with long dark hairs, swollen in front, fang groove oblique, three teeth on superior margin of fang groove, middle one largest, two minute teeth, widely separated on inferior margin; sternum pale; abdomen pale, covered with dark hairs and irregular shaped dots, not arranged in any pattern, venter pale with a few scattered dark dots; legs 4–2–1–3, little difference in length, pale, ventral side of femora with many dark spots, anterior metatarsi with heavy irridescent scopula, not as heavy on III metatarsus and much lighter on IV, spines, I pair, femur, scattering on dorsal side, patella, 0, tibia, ventral, 2–2–2, lateral, 2, dorsal, 0, spines on II pair same but smaller; epigynum a small semicircular chitinized lobe, as wide as long, anterior beneath the skin are two long narrow darkened areas, almost parallel.

Male. Length, 6.1 mm., ceph. 3.6 mm., abd. 2.6 mm.

Cephalothorax same as in female but the dark lines are less numerous and not as heavy; eyes same as in female; mandibles smaller, teeth same; abdomen same as in female with dark dots on a pale ground; legs, 4–2–1–3, pale, with no dark dots, very slender, scopula on metatarsi not as heavy as in female, spines, I and II pairs, femur, scattered, patella, 0, tibia, ventral, 2–2–2, lateral, 2–2 and 1 small spine opposite basal pair, dorsal, 1 small spine near tip, metatarsus, ventral, 2–2, lateral, 1–1, dorsal, 0; palpus, about as long as cephalothorax, tibia little longer patella, with a rounded lateral knob near base on retrolateral side and two heavily chitinized apophysis at distal end, the outer much larger and heavier, the lower small and covered by lobe from bulb, embolus starts from near base, follows contour of cavity and ends at the tip with end bent at right angle from the plane, parallel and directly below is the conductor, not as heavily chitinized, with tip also bent at an angle, below tip on conductor is a sharp tooth, in the middle arises a white filament, the basal half rather

broad with distal half very slender and curved like a sickle, ending between embolus and conductor, the opposite side is filled with a triangular lobe with a dark tip.

Holotype ♂ Cuba; Oriente, South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Allotype ♀ Cuba; Orient, South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

The genotype of *Stasina* came from the Philippines but in the same paper, Simon described two species from Brazil. Petrunkevitch described a female from Puerto Rico. From the figure of the epigynum of this latter species, it is very likely that it is immature. In 1936, Franganillo described a species from the Sierra de Rangel, comparing it with the species from Puerto Rico, so it is probably a female. His description gives little more than the generic characters.

There are, evidently, at least two species of the genus in the Oriente, easily separated in the males by the tibia of the palpus and the embolus. The females can be separated by the color of the abdomen, very dark in *S. lucasi* and pale in *S. macleayi*. Also, *S. lucasi* has no lateral spines on tibia and metatarsus, while *S. macleayi* has two lateral spines on the tibia and one lateral on the metatarsus. They also can be separated by the epigynum.

Two specimens of a third species from San Vicente and Soledad have been seen which do not agree with Franganillo's description and probably are undescribed. It is smaller than the other two with a smooth cephalothorax, pale abdomen with very few dark spots and the I tibia with four pairs of ventral spines, two lateral and two pairs on the metatarsus.

Sub-family HETEROPODINAE

Genus Heteropoda Latreille 1804

Heteropoda venatoria (Linn.)

Aranea venatoria Linnaeus, Syst. Nat., 1767, p. 1035.

This is a common cosmotropical species found in all tropical and subtropical regions. Petrunkevitch in his Spiders of Porto Rico Trans. Conn. Acad., 1930, **31**, p. 14, figs. 8–14, gives an account of the habits and figures the palpus and epigynum.

Family SELENOPIDAE

Sub-family SELENOPINAE

Selenops celer (MacLeay)

Figure 178

Hypolataca celer MacLeay, Ann. Mag. Nat. Hist., 1839, p. 6, pl. 1, fig. 2.
Selenops celer, Banks, 1909, p. 165.

Female. Length, 6.5 mm., ceph. 3.0 mm. long, 3.2 mm. wide, abd. 3.8 mm.

Cephalothorax bright brown with darker margins, stiff black bristles about lateral margins directed forward, sides covered with short, white hairs, radial striae distinctly marked; eyes, anterior row recurved, a.m.e. separated by a little more than a diameter and from p.m.e. by less than half a diameter, a.m.e. about two-thirds diameter of p.m.e., a.l.e. oval, less than one half diameter of a.m.e., very near margin of clypeus, p.m.e. separated from p.l.e. by more than diameter of p.l.e.; mandibles brown, swollen at base, superior margin of fang groove with three teeth, middle one largest, scopula on superior margin, inferior margin with two widely separated teeth; labium wider than long, tip rounded, lateral margins at basal half excavate; maxillae more than twice as long as labium, inner margins parallel; sternum almost round, tip bilobed; abdomen grayish-brown without marks, broadest at base, sides dark, venter pale gray; legs missing, the three remaining have three wide spots on dorsal sides of femora, tibiae and metatarsi which look like bands, ventral sides pale, spines, I and II pairs, tibia, 2–2–2, lateral, 0, metatarsus, ventral, 2–2, lateral, 0; epigynum, a triangular light area, with margins strongly chitinized, with apex near fold, each side of apex are two horizontal dark tubes beneath the skin, openings are probably in large, widely separated depressions near base of triangle.

♀ Cuba; Santiago de las Vegas, (Baker), Banks Coll.

♀ Cuba; Soledad, under bark in sugar field, 3 August 1931, (Worley).

The specimen from Santiago de las Vegas is dark from age and the legs are much broken, so that the relative lengths cannot be given, but it was collected near the type locality and the markings on the legs and the eyes are very much like the original figures. The specimen from Soledad may be one molt from maturity but it is evidently the same species.

Selenops formosus spec. nov.

Figure 181

Female. Length, 9.5 mm. long, including mandibles, ceph. 3.5 mm. long, 4.0 mm. wide, abd. 5.5 mm.

Cephalothorax chestnut-brown, margins black, sides heavily veined with black, lateral margins with stiff black bristles directed forward, cephalothorax thickly covered with short white hairs most conspicuous when dry; eyes, row of median eyes slightly recurved, a.m.e. separated by a scant diameter and from p.m.e. by less than a diameter, a.m.e. about three-quarters of diameter of p.m.e., a.l.e. oval, less than one-half diameter of a.m.e., directly below p.l.e. and about a diameter of a.l.e. from latter; mandibles chestnut-brown with two divergent black lines, swollen at base, stiff black hairs on median edge, superior margin of fang groove with three teeth, scant scopula of long hairs to base of fang, inferior margin with two subequal teeth; labium wider than long, tip rounded, lateral margins excavate at basal half; maxillae more than twice as long as labium, margins almost parallel; sternum bright yellow, almost round, tip bilobed; abdomen pale, heavily mottled with black and irregular chevrons on posterior half, sides dark, venter pale; legs, I and II left legs missing, 2–3–1–4, II and III pairs of almost equal length, bright yellow with three broken dark bands on dorsal sides of femora and two dark bands on tibiae and metatarsi, ventral sides pale, spines, I and II pairs, tibia, ventral, 2–2–2, long and overlapping, lateral, 0, metatarsus, ventral, 2–2, long and overlapping, lateral, 0; epigynum is similar to *Selenops insularis* Keys. but the median Y-shaped suture is very slender and has a very long stem.

Holotype ♀ Cuba; Soledad, quarry, 4 August, 1931, (Worley).

This species is smaller than *Selenops insularis* Keys. and has a different epigynum.

Selenops insularis Keyserling

Selenops insularis Keys., 1881, p. 311, pl. 11, fig. 28; Petrunkevitch, 1930, p. 31, figs. 21–25.

This species was described from a female from Haiti, which is now in the Museum of Comparative Zoölogy. Petrunkevitch found it in Puerto Rico and described the male for the first time. Both males and females have been found at Havana and Soledad, and Franganillo has reported a male from Guantánamo, Oriente.

Selenops submaculosus spec. nov.

Figures 177, 184

Female. Length, 13.0 mm., including mandibles, ceph. 4.5 mm. long, 5.2 mm. wide, abd. 7.0 mm.

Cephalothorax reddish-brown with a narrow black marginal line and long stiff bristles directed forward, sides with soft white hairs, black about p.l.e.; eyes, row of median eyes slightly recurved, p.m.e. only slightly larger than a.m.e., a.m.e. separated by a scant diameter and from p.m.e. by less than a radius, a.l.e. oval, small, upper margins on a straight line with lower margins of p.m.e. and midway between p.m.e. and p.l.e.; clypeus about equals one-half diameter of a.m.e.; mandibles chestnut-brown with two narrow divergent black stripes, superior margin of fang groove with three teeth, middle one largest, inferior margin with two widely separated teeth, scopula on superior margin; labium wider than long, lateral margins at basal third deeply excavate; maxillae twice as long as labium, sides parallel; sternum bright yellow, as wide as long, tip deeply bi-lobed; abdomen yellowish-gray with sides black from fold to spinnerets; legs, 2–3–4–1, yellowish-gray with prolateral black stripe with an irregular margin, so that it extends on dorsal side as points of all femora, tibiae and metatarsi, spines, I and II pairs, tibia, ventral, 2–2–2, middle pair longest, lateral, 0, metatarsus, ventral, 2–2, lateral, 0; very little difference in length of legs; I and IV left missing; epigynum of the usual triangular shape with dark parts showing beneath the skin, openings probably in widely separated depressions each side of basal part of triangular area.

Male. Length, 9.0 mm., ceph. 4.5 mm. long, 4.5 mm. wide, abd. 4.5 mm.

Cephalothorax light reddish-brown with a narrow black marginal line; eyes, mandibles, maxillae and labium same as in female; sternum not as deeply bi-lobed as in female; abdomen same as in female; legs, 2–3–4–1, much longer and more slender than in female, the dark prolateral stripe less conspicuous and without the irregular margin found in the female, spines, I and II pairs, tibia, ventral, 2–2–2, lateral, 2, metatarsus, ventral, 2–2, lateral, 1; palpus, patella and tibia of about equal length, upper apophysis of tibia large, dark and sides folded inward, lower apophysis a rounded black lobe pressed flat on the under side of tibia and best seen in a lateral view, palpal organ similar to *Selenops insularis* Keys. but "the pick-ax" conductor with a much

longer stem and the ends sharper, the small hook process above the origin of the embolus is bifid, and the inferior tip is short and slender.

Holotype ♀ Cuba; Soledad, February 1925, (Salt).

Allotype ♂ Cuba; Soledad, February 1925, (Salt).

Paratypes ♂ ♀ Cuba; Soledad, February, (Salt).

It is possible that Franganillo's identification of *Selenops radiatus* Latreille may be this species. Simon describes it with black lateral lines and sometimes a cross black line on the abdomen, but the figures show that p.m.e. are much farther from the a.l.e. than in the Cuban species. *Selenops radiatus* is found in Spain, Southern France, about the shores of the Mediterranean, and in Southern Asia.

Selenops timidus spec. nov.

Figure 183

Female. Length, 12.5 mm., including mandibles, ceph. 5.0 mm. long, 5.5 mm. wide, abd. 6.5 mm.

Cephalothorax golden-brown, darker about eyes, a faint black line about the margin, edge of carapace with long black hairs, not bristles, directed forward; eyes, row of median eyes slightly recurved, a.m.e. about two-thirds diameter of p.m.e. and separated from each other by a little more than a diameter and from p.m.e. by about a diameter, lower margins of median eyes form a straight line, a.l.e. small, oval, directly beneath p.l.e. and nearer to p.l.e. than to p.m.e.; mandibles reddish-chestnut, swollen at base and covered with long stiff bristles; superior margin of fang groove with three teeth, middle largest, scant scopula, inferior margin with two widely separated, subequal teeth; labium wider than long, lateral margin at base deeply excavate, tip straight; maxillae bright yellow, more than twice as long as labium; sternum bright yellow, wider than long, tip not deeply bi-lobed; abdomen pale brown, thickly covered with long silvery hairs, venter pale; legs, 2–3–4–1, pale brown without marks but metatarsi and tarsi darker; spines, I and II pairs, tibia, ventral, 2–2–2, lateral, 0, metatarsus, ventral, 2–2, lateral, 0, II, III and IV right legs missing; epigynum a large circular opening above two darkened circles beneath the skin, with a notch above the fold that is shallow and truncate.

Holotype ♀ Cuba; Esenada de Cochinos, 2 March, 1917, (Barbour and Brooks).

This species is the same size as the specimen described by Keyserling from the Tortugas Islands, Florida in the Marx Collection under the

name *Selenops aissus* Walckenaer. Petrunkevitch, in his paper on Panama Spiders, Trans. Conn. Acad., 1925, **27**, p. 134, figs. 50–54, states that it is not *Selenops aissus* Walck., because the relative length of the legs does not agree with Walckenaer's statement. In 1883, Simon examined Walckenaer's type and found that the specimen was in such bad condition that a new description of it was impossible, although it undoubtedly belonged to that genus. Until the *Selenops* from Martinique are examined, it probably will be impossible to definitely determine Walckenaer's species. The difference in the length of legs is not very great, and one or even two millimeters would hardly be noticeable from a casual examination under a hand lens. The epigynum of *Selenops timidus* differs from the figures given by Keyserling and Petrunkevitch.

Family THOMISIDAE

Sub-family STEPHANOPSINAE

Genus Isaloides F.O.P. Cambridge 1900

Isaloides toussanti Banks

Figures 185, 189

Isaloides toussanti Banks, 1903, p. 343, pl. 15, fig. 3.

Male. Length, 4.0 mm., ceph. 1.6 mm. long, 1.8 mm. wide, abd. 2.2 mm.

Colors much faded probably from age.

Cephalothorax pale brown, slightly darker about margins, anterior margin less than half the greatest width; eyes, anterior row strongly recurved, a.l.e. largest of the eight, a.m.e. smallest, separated by about two diameters, posterior row slightly longer than anterior and not as strongly recurved, eyes equidistant, and p.m.e. but little smaller than p.l.e., p.m.e. separated by a diameter and a half, lateral eyes on separate tubercles; quadrangle of median eyes narrower in front and one and a half times as high as wide behind; clypeus as wide as space between a.m.e., retreating, with two long bristles on margin; mandibles vertical, with a few long bristles on median margin, but because of thick scopula teeth on fang groove they can not be seen; labium as long as wide; maxillae twice as long as labium; sternum triangular, widest between second coxae and ending in a point in front of fourth coxae, second coxae largest, twice as large as third, fourth coxae almost touching; abdomen two-thirds as wide as long, yellowish-gray,

paler on sides, six pairs of graduated tubercles or small blisters from base to spinnerets, and very long clavate bristles scattered over dorsum, venter pale, closely mottled with dark veins; legs, anterior pairs much longer than posterior, I pair,

femur	patella plus tibia	metatarsus	tarsus	total
3.0 mm.	4.0 mm.	3.0 mm.	1.0 mm.	11.0 mm.

anterior pairs, femur pale brown, tibia with a dark band at distal end, posterior pairs, paler, with dark band much narrower, spines, I and II pairs, femur, row of 4 dorsal spines and 3 very long prolateral spines, tibia, ventral, 2–2–2–2, distal pair very short, others about three times the diameter of the joint, lateral, 3, metatarsus, ventral, 2–2–2, distal pair very short, lateral, 3, scopula very scant on anterior tarsi and metatarsi; palpus very simple, femur as long as tibia plus patella, tibia but little longer than patella, with no apophysis; embolus a slender black tube, circling once and a half around margin and ending opposite to origin.

Holotype ♀ Haiti; Port au Prince, Banks Coll.

Allotype ♂ Cuba; Santiago de las Vegas, (Horne and Houser), Banks Coll.

♂ ♀ Cuba; Santiago de las Vegas, Banks Coll.

The genus was based on a female from Mexico. *Isaloides toussanti* Banks from Haiti is very similar to the type species but differs in the epigynum. The male has the anterior pairs of legs very much longer than in the female; the cephalothorax is wider and the abdomen has clavate bristles.

Genus Onocolus Simon 1895

Onocolus granulata spec. nov.

Figures 186, 187

Male. Length, 2.5 mm., ceph. 1.2 mm., abd. 1.1 mm.

Cephalothorax chestnut-brown, posterior median area much paler, almost as wide as long, (4.4 : 5.0), much narrowed in front of first coxae, rather flat, with median third rising as a crest with a row of granules, radial striae marked by rows of small granules, sides evenly rounded, margin above first coxae granular; eyes cover two-thirds width of head, anterior row strongly recurved, a.m.e. smallest of the eight, separated by little over a diameter and from a.l.e. by a diameter, a.l.e. largest of the eight, fully twice diameter of a.m.e., posterior row straight, little longer than anterior, p.m.e. slightly smaller than p.l.e. and separated from p.l.e. by diameter of latter; quadrangle of median

eyes much narrower in front and about as wide as high; clypeus as high as quadrangle, inclined forward with a row of bristles on margin, each from a granule; mandibles dark brown, flat, cone-shaped, fang groove short, impossible to see teeth, fang short and weak; labium dark brown, wider than long, lateral margins on basal third notched; maxillae pale brown, twice as long as labium, inclined so that tips almost meet, palpi inserted about middle; sternum pale brown, three-quarters as wide as long, slightly convex, smooth, lateral margins notched, tip rounded between fourth coxae, fourth coxae separated by more than half a diameter; abdomen cream-white at base, dark brown at tip and on posterior lateral points, pentagonal, one-fourth wider than long, anterior and lateral margins granular, tip and posterior lateral angles with larger dark granules, three at tip and two on lateral angle, entire dorsum covered with small granules which on posterior half are in transverse rows, venter pale brown, sparsely covered with short hairs, sides with converging rows of granules, spinnerets surrounded by a chitinous ring; legs short, 1–2–3–4, III pair directed forward, anterior pairs dark brown, tarsi yellow, posterior pairs, femora brown, other joints pale, anterior pairs flattened anteriorly with a distinct edge marked with granules, short hairs on upper side and long hairs between spines, no spines on posterior pairs, spines, I and II pairs, tibia, ventral, 2–2–2, from a raised base, basal and median pairs longer than diameter of joint and overlapping, lateral, 0, dorsal, 0, metatarsus, ventral, 2–2–2, from a raised base, longer than diameter of joint, all spines with tips curved out, palpus short, dark brown, patella and tibia granular, tibial apophysis pale, not half as long as cymbium, truncate with a hook, palpal organ very simple.

Holotype ♂ Cuba; Sierra de Cobre, 3,000–3,800 feet, 3–7 July, 1936, (Darlington).

Onocolus granulata belongs to the section of the genus that has no paired tubercles on clypeus or between a.m.e. Franganillo has reported two species from the western part of Cuba that belong to this subfamily. In *Onocolus pentagona* (Keys.) from Peru, Brazil and Panama, more recently redescribed by Dr. Mello-Leitao, the male has a pentagonal abdomen with distinct spines at the tip and posterior angles and the palpus has a lateral spine on the patella. In the second species, *Stephanopoides brasiliana* (Keys.), the p.m.e. are nearer each other than to the p.l.e. and the quadrangle of median eyes is scarcely narrowed in front. In the Banks Collection there are immature males from Santiago de las Vegas that have eyes similar to *Onocolus granulata*, but the lateral margins of the cephalothorax are almost parallel.

Onocolus pallescens spec. nov.

Figure 195

Female. Length, 8.0 mm., ceph. 3.6 mm. long, 3.1 mm. wide, abd. 4.5 mm. long, 4.5 mm. wide.

Cephalothorax pale yellow, flat and low, much narrowed in front of first coxae, sides almost parallel, a few granules on margin above first and fourth coxae, a few granules on posterior straie, no thoracic groove; eyes cover little more than middle half of front, anterior row strongly recurved, equidistant, a.m.e. smallest of eight, separated by a little more than a diameter, a.l.e. largest of the eight, posterior row longer than anterior, straight, eyes subequal, p.m.e. widely separated and by more than a diameter from p.l.e., lateral eyes separated by a diameter of a.l.e.; quadrangle much narrowed in front and as wide as high; clypeus about as high as quadrangle with four small tubercles on margin, each bearing a bristle; mandibles pale, vertical, fang groove slightly oblique, three small teeth on superior margin and two small teeth on inferior; labium pale, as long as wide; maxillae pale, twice as long as wide, (7 : 4), fourth coxae touching; abdomen pentagonal, white with bright brown spots at tip and at posterior angles, thickly covered with white granules which are largest at anterior margin, three large granules at tip, venter pale with hairs in center as in male, sides have converging rows of granules; legs, 1–2–3–4, III pair directed forward, white, I pair flattened anteriorly with rows of granules on edge, each bearing a small clavate bristle, spines, I and II pairs, tibia, ventral, 2–2–2, heavy, less than diameter of joint, lateral, 0, dorsal, 0, metatarsus, 2–2–2, basal and median pairs equal diameter of joint, all spines with tips that curve out, posterior pairs spineless; epigynum, an upward turned lobe with edge slightly chitinized, openings widely separated, with tubes almost touching and parallel, leading to sacs beneath openings.

Holotype ♀ Cuba; South side Pico Turquino, 3,000–5,000 feet, June 1936, (Darlington).

It is possible that *Onocolus pallescens* is the female of *O. granulata*, although they differ in several fundamental points that may not be sexual. In *O. pallescens*, the lateral margins of the cephalothorax are almost parallel, there are a few granules on the margins, and the radial striae are not marked by rows of granules; there is no median crest, the sternum is longer in proportion to the width, and the fourth coxae almost meet, while in *O. granulata* they are separated by a diameter.

According to Dr. Mello-Leitao, several species from Brazil show as much difference in size between male and female, and the striking difference in color is not unusual in other species of the family.

Genus Parastephanops F.O.P. Cambridge 1900

Parastephanops echinatus (Banks)

Figure 194

Misumessus echinatus Banks, 1914, p. 641, pl. 43, fig. 6.

Female. Length, 8.0 mm., ceph. 3.5 mm. long, 3.2 mm. wide, abd. 4.8 mm., I femur, longer than ceph.

Cephalothorax yellowish, without any indications of a lateral dark stripe but has numerous scars from spines or bristles; eyes cover middle half of head, anterior row slightly recurved, a.m.e. very small and separated by a scant diameter, fully two diameters from a.l.e., a.l.e. largest of the eight, posterior row less recurved than anterior and slightly longer, eyes subequal, p.m.e. slightly nearer p.l.e. than to each other, lateral eyes on separate tubercles; quadrangle of median eyes much narrower in front and a little higher than wide behind; clypeus as high as quadrangle; mandibles rather flat in front, with scattered long hairs, inferior margin of fang groove with two subequal teeth, superior margin with three teeth, one large tooth about opposite teeth on inferior margin, a minute tooth near base of fang, and a tooth subequal to teeth on inferior margin on median edge, scant scopula on superior margin; labium slightly longer than wide, basal third excavate on lateral margin; maxillae about twice as long as wide, tips slightly enlarged and a little inclined over labium; sternum little longer than wide, flat, widest between first and second coxae, fourth coxae almost touching; abdomen pale yellow without marks, with scattered long hairs, venter with a broad white stripe from fold to spinnerets; legs, yellowish, anterior pairs longer than posterior, I and II subequal, spines, I pair, femur, 6 short, stubby spines and numerous hairs or bristles from corneous pits, tibia, ventral, 2–2–2–2, three basal pairs heavy and longer than the diameter of the joint, lateral, 3, metatarsus, ventral, 2–2–2, two basal pairs heavy and twice the diameter of the joint, lateral, 3, spines on II pair not quite as heavy as on I pair, III and IV pairs, few spines on femur and short paired spines on tibia and metatarsus; epigynum an oval depression, longer than wide, about one quarter above the fold, with two dark depres-

sions near base, separated by a narrow septum, midway between base of depression and fold are two dark dots close together.

Allotype ♀ Cuba; Santiago de las Vegas, (Horne and Houser), Banks Coll.

Through the kindness of Dr. W. J. Gertsch of the American Museum of Natural History, I have examined the holotype, a male from Pinar del Rio. The generic position of the species is uncertain. It has more characters in common with *Parastephanops* than with any genus in the Biol. Centr. Amer. However, it does not agree with that genus because of a single subapical spine beneath on metatarsi I and II, a primary character used by F.O.P. Cambridge in his key for genera; neither is the eye area bi-lobed, or the quadrangle of median eyes wider than high, a character that was not mentioned or figured by O.P. Cambridge in the original description of *Parastephanops cognatus*, the genotype; it does agree however, in eye arrangement and the number of teeth on the fang groove of the mandibles. At the same time, F.O.P. Cambridge made the genus *Isaloides* for a single species. In this genus the eye area occupies almost the entire width of the head, the p.l.e. are much larger than the p.m.e., and in the two species referred to the genus, the abdomen has paired blisters in the median area. This genus also, has a single subapical spine beneath on metatarsi I and II. The male has the same arrangement of eyes and the cephalothorax is covered with heavy spines. It is very much smaller than the female, a character often found among the Thomisidae.

Sub-family MISUMENINAE

Genus Misumenops F.O.P. Cambridge 1900

Misumenops bellulus (Banks)

Figures 188, 191, 192

Misumena bellula Banks, 1896, p. 71.

Female. Length, 4.0 mm., ceph. 1.5 mm. wide, 1.5 mm. long, abd. 2.5 mm.

Cephalothorax with broad dark stripes from p.l.e. to posterior margin, long black bristles outline cephalic portion; eyes, anterior row recurved, equidistant, a.m.e. slightly smaller than a.l.e., posterior row little longer than anterior, eyes subequal, p.m.e. a little nearer each other than to p.l.e., a faint depression on ridge between a.l.e. and p.l.e.; quadrangle of median eyes slightly wider behind and wider than high; clypeus slightly protruding, one half as high as quadrangle,

with several long bristles on margin; abdomen, median area shaded with gray, on posterior half are three dark cross bars, many scattered bristles, each from a red spot, venter pale; legs, anterior pairs much longer than posterior, pale with distal ends of joints darker, posterior pairs pale, all legs with few hairs, spines, I pair, femur, prolateral near base, 3, short and stout, dorsal, 3 or 4 on distal half, all shorter than diameter of the joint, tibia, ventral, 3–4, lateral, 0, metatarsus, ventral, 6 or 7 pairs, lateral, 0; epigynum with a chitinous hood or lobe at anterior end, above a triangular pale area, below are two pairs of horizontal dark bars starting from dark spots, these spots being nearer the pale area than the fold.

Male. Length, 2.5 mm., ceph. 1.0 long, 1.2 mm. wide, abd. 1.6 mm.

Cephalothorax and eyes same as in female; abdomen dark yellow, with cross bars less distinct than in female but with the same bristles from red dots, venter pale; legs, anterior pairs very long, dull yellow with many red spots and a narrow red ring at end of each joint, posterior pairs much shorter with narrower red rings at ends of joints, spines, I pair, femur, prolateral, 4, basal very short, dorsal, 4, all spines as long as diameter of joint, tibia, ventral, 2–2–2, long, slender and weak, prolateral, 3, long, dorsal, 4, metatarsus, ventral, 2–2, long and weak, prolateral, 2; the general appearance of the anterior pairs of legs, is of many long and slender spines; palpus, patella, and tibia of about equal length, tibial apophysis with a broad truncate tip with upper corner produced in a rounded point, palpal organ very simple, embolus arises from near the upper margin with a distinct dark lobe on outer side, extends across top of palpus as a broad thick tube, abruptly narrowing half way to tip, and continues as a slender black tube that curves from the plane, best seen in a lateral view and ends on the tutaculum above the tibial apophysis.

The type of this species was a female from Punta Gorda, Florida. Since then, both males and females have been found at Dunedin and the Royal Palm Park. It is a very common species in collections from Cuba, and has been taken at all seasons at Soledad. It is smaller than *M. celer* and varies greatly in coloring, especially in the females, as some have been seen with no abdominal pattern. The males are easily separated from the other species found in Cuba by the palpus, as the embolus has a dark lobe at the origin and narrows abruptly about the middle. The females can be distinguished by the epigynum where the two cross bars are usually distinct.

Misumenops celer (Hentz)

Thomisus celer Hentz, 1847, p. 446, pl. 23, fig. 5.
Misumena spinosa Keyserling, 1880, p. 86, pl. 2, fig. 42.
Misumenops spinosus, F.O.P. Cambridge, 1900, p. 144, pl. 10, fig. 6.
Misumenops celer, Petrunkevitch, 1930, **31**, p. 41, figs. 31–34.

This is a common species in the southern and western parts of the United States. It occurs in collections from Havana and Soledad, and probably will be found all over Cuba. Petrunkevitch found it in Puerto Rico.

Misumenops oblonga (Keyserling)

Misumena oblonga Keyserling, 1880, p. 79, pl. 2, fig. 41; Emerton, Trans. Conn. Acad., 1892, **8**, p. 371, pl. 30, fig. 4.
Misumena americana Keyserling, 1880, p. 85, pl. 2, fig. 44.

This species can be separated from others found in Cuba by the very short spines on the first femur in both males and females. The male palpus, where the embolus gradually decreases in size, follows the contour of the cavity, and disappears as a slender tube near the base; it lacks the dark lobe at the origin of the embolus found in *M. bellulus* and apparently has no tutaculum. The first pair of legs has no spines on the tibia and metatarsus, and the row of 4 dorsal spines on the femur are all very short. Only one pair from Soledad have been seen, taken by Dr. P. J. Darlington in August 1934.

Genus Xysticus C. Koch 1835

Figure 198

Xysticus laticeps Bryant, 1933, p. 178, pl. 3, fig. 25.

Female. Length, 8.3 mm., ceph. 4.0 mm. long, 3.5 mm. wide, abd. 4.5 mm.

Cephalothorax very dark brown with median paler area only faintly shown, head very broad, only slightly narrowed in front of the first coxae; mandibles slightly swollen, very dark brown; sternum brown with a median row of dark spots and scattered dark spots about the margin, coxae light brown, each with two widely separated dark spots; abdomen pale brown, very much faded, showing only a row of dark spots about edge of folium, entire abdomen covered with short, stiff spines, venter pale brown with a pair of curving dark stripes from lung

slits to spinnerets; legs, left legs missing, light brown with a distinct line of darker brown on femora, patellae and tibiae, spines, I pair, tibia, ventral, 7–5, lateral, 0, metatarsus, ventral, 6–5, lateral, 2, IV femur, a pair of dark spots at tip; epigynum with a narrow septum.

Male. Length, 5.0 mm., ceph. 2.5 mm. long, 2.4 mm. wide.

Cephalothorax light brown with two pairs of dark stripes, one on margin from first coxae and the second from the p.l.e. converging slightly and ending at the pair of dark spots near posterior margin, median dark line paired, only slightly narrower than lateral stripes and rather faint, ending at the small dark spot at the thoracic groove, pale areas with scattered dark spots, head very wide and only slightly narrowed in front of first coxae; mandibles dark brown; sternum, mouth parts, coxae and ventral sides of legs pale brown, sternum with scattered dark spots, and each coxa with two dark spots even more distinct than in female; abdomen, median area cream white with five pairs of muscle spots of light brown, a pair of spreading dark brown lateral stripes from dark basal spot which narrow and disappear before reaching spinnerets, posterior half with faint cross lines of brown, sides of alternate cream and brown lines, venter pale with dark stripes very distinct from lung slits to spinnerets; legs brown, I pair, femur longer than cephalothorax, with a broad vague dark stripe, each spine from a dark spot, spines, I femur, 5 short spines on dorsal crest, prolateral, 5–6, tibia, ventral, 2–2–2–2, lateral, 2 on apical half, metatarsus, ventral, 2–2–2, lateral, 2, anterior tarsi and metatarsi pale yellow; palpus, tibia and patella of about equal length, superior tibial apophysis ending in a blunt tip beneath tuctaculum, inferior apophysis protruding from tibia on ventral side, large and extending on palpal organ, ending under the ventral apophysis, tutaculum a slender curved tip at right angles to cymbium, embolus of usual type, inferior apophysis cleft to base, lower division smaller, straight and slender, lighter colored, and two thirds as long as upper section which is straight, black and ends in a sharp point, superior apophysis much larger and heavier, of the usual hammer-shape, and crosses the upper branch of the inferior apophysis, the stem portion thickened, and at base produced in a triangular darkened hump.

Allotype ♂ Cuba; Cienfuegos, San José, 31 July, 1931, (Worley).
♂ Cuba; Soledad, sweeping, 7 August, 1931, (Worley).
♀ Cuba; (Poey).

This species was described from a female from Mobile, Alabama, collected by sweeping, 2 August, 1930 by Dr. W. S. Creighton. Later, W. S. Blatchley caught a female at Dunedin, Florida. The Cuban

female, collected by Poey, has no definite locality and is very dark from age. The species is easily identified by the very broad head, even wider than *Xysticus luctans* Koch, the pair of dark spots on the coxae, and the dark curving stripes on the venter, and in the male by the bifid lower apophysis in the palpus. Franganillo has reported *Xysticus pellax* Cambr. a Central American species, from Camagüey. It is not unlikely that it is this species.

Family APHANTOCHILIDAE

Genus Majellula Strand 1932

Majellula pulchra spec. nov.

Figures 190, 197

Male. Length 2.7 mm., ceph. 1.8 mm., abd. 1.8 mm.

Cephalothorax dark mottled brown with a transverse pale area between median eyes, with numerous cusps or spinigerous tubercles which in dorsal view appear as bright yellow spots, sides evenly rounded, anterior margin truncate and almost twice as broad as posterior, entire carapace corrugate and each cusp in life probably bearing a stout spine as a few remain, a stout horn between lateral eyes with a cusp on posterior margin bearing a short spine, thoracic groove missing but middle area depressed; eyes, anterior row recurved, a.m.e. small and widely separated, p.l.e. largest of the eight, on a low tubercle at anterior base of horn, separated from a.m.e. by fully a diameter and a half, posterior row parallel to anterior and slightly longer, p.m.e. and a.m.e. subequal, p.l.e. at base of horn on posterior side, p.m.e. nearer to p.l.e. than to each other; quadrangle of median eyes narrower in front and wider than high; clypeus little more than width of quadrangle, protruding, with a spine from a raised base at each lower angle; mandibles dark brown, small, vertical, anterior face with four or five long spines projecting forwards, each from a raised base, fang and fang groove very short, impossible to see if teeth are present; labium dark brown, reduced to little more than a line between maxillae; maxillae dark brown, as long as sternum, basal half heavy and convex, bearing the palpi, distal half much narrower, flat with a few spines near the tip that touches the fang groove; sternum dark brown, heart-shaped, three-quarters as wide as long, widest between II coxae and ending in a round point anterior to IV coxae, IV coxae with a small tubercle on distal half; abdomen oval, almost as broad as long, dorsum flattened,

brown, darker in middle area, with irregular pale marks, the largest, a widely separated pair on posterior half, many small tubercles each bearing a short spine, sides with longitudinal dark stripes, venter gray with scant, short bristles; legs, III right missing, 1–2–4–3, anterior pairs longer, dark brown with irregular flecks of cream, basal half of II, III and IV femora pale, all femora with small granules most numerous on distal half, spines small and inconspicuous; palpus dark brown, very short, patella much swollen and seen from above two-thirds as long as terminal joint, tibia reduced to a ring dorsally but produced in a lateral bifid apophysis, the upper lobe rounded and rests against the cymbium, the lower, longer, with a curved tip that rests against the embolus, palpal organ very simple, embolus rising at tip of the cavity, follows the contour of the cavity and ends as a slender dark line above its origin.

Holotype ♂ Cuba; Soledad, May 1936, (Darlington).

The genus *Majella* was established by O.P. Cambridge in 1896, in the Biol. Centr. Amer., 1, p. 191 for a female from Atoyac, Vera Cruz. The name was preoccupied by Ortmann, 1893, and in 1932, Strand proposed the name *Majellula*. The genus is separated from *Bucranium* Cambr. by the relative position of the eyes of the posterior row. The latter genus was founded on an immature female from the Amazons. In 1895, Simon in the Hist. Nat. Araignées, figured the male palpus of *Bucranium taurifrons*, the genotype. The figure of this palpus is very similar to *Majellula pulchra*, differing only in the bifid apophysis of the tibia. The genus *Majellula* may prove to be a synonym of *Bucranium* as the two are separated by a character that may prove to be of doubtful value in this group. In 1900, F.O.P. Cambridge in the Biol. Centr. Amer., 2, p. 165, placed a second species described by O.P. Cambridge, in the genus *Majella*, stating that it probably was a synonym of the genotype.

Family CLUBIONIDAE

Sub-family CLUBIONINAE

Genus Cheiracanthium C.L. Koch 1839

Cheiracanthium ferum O.P. Cambridge

Cheiracanthium ferum O.P.Cambridge, 1897, p. 228, pl. 29, fig. 8.
Cheiracanthium debile id., ibid., p. 229, pl. 29, fig. 7; F.O.P. Cambridge, 1899, p. 86.

Male. Length, 4.6 mm., ceph. 2.0 mm., abd. 2.7 mm.

Cephalothorax pale yellow, thinly covered with fine hairs, no thoracic groove, anterior margin not much narrowed, cephalic portion only slightly arched; eyes covering almost entire width of head, anterior row straight, subequal and equidistant, posterior row straight, same length as anterior row, p.m.e. nearer p.l.e. than to each other, p.m.e. slightly largest of the eight, lateral eyes almost touching; quadrangle of median eyes slightly narrowed in front and wider than high; clypeus almost wanting below a.m.e.; mandibles vertical, brown, much darker at tip, boss present, swollen at base, distal third much narrowed with a narrow black ring at constriction, fang groove oblique, both margins with a fringe of long hairs so that it is difficult to see teeth, fang a simple curve; labium with tip rebordered, sides converging; maxillae more than twice as long as labium with a dense scopula of black hairs at tip; sternum pale, slightly convex, fourth coxae separated by half a diameter; abdomen pale with the usual darker spear-mark at base, thinly covered with short hairs, colulus wanting, inferior spinnerets short and stout, superior pair longer with terminal joint very slender; legs, 1–2–4–3, pale with tips of tarsi very dark, I pair much the longest, spines unpaired, tibia, 5–3, metatarsus, ventral, 1–1 at base, II pair with a very stout obtuse prolateral spine on femur and a much smaller movable spine from a raised base at base of tibia, 1 median spine, metatarsus, 1–1, basal, III and IV metatarsi with group of ventral, distal spines; palpus not quite as long as cephalothorax, tibia longer than patella, tibial apophysis with a slender incurving tip, the interlocking process much longer and broader with reddish obtuse tip curving upward, terminal joint about twice as long as wide, embolus starts on side about midway of bulb, is quickly reduced to a slender black tube which disappears beneath the bulb at margin, starting in center and directed towards the tip is a flattened black piece which broadens distally, with a truncate tip, one corner of which is prolonged in an incurving spine.

♂ Cuba; Soledad, April 1936, (Darlington).

This is much smaller than *Cheiracanthium inclusum* (Hentz). Under the name of *C. debile*, Franganillo has reported *C. ferum* from various parts of Cuba but this specimen is much smaller than the dimensions given for that species. This male has moulted recently, so that it is not easy to distinguish the parts, and it still may be one moult from maturity. *C. inclusum* lacks the black spine or hook at the end of the central piece of the palpus.

Cheiracanthium inclusum (Hentz)

Clubiona inclusa Hentz, 1847, p. 451, pl. 23, fig. 18.
Cheiracanthium viride Emerton, Trans. Conn. Acad., 1889, **8**, p. 184, pl. 5, fig. 12.
Cheiracanthium inclusum, Petrunkevitch, 1930, **31**, p. 53, figs. 46–48.

This species is common in the United States, and it has been reported from most of the islands of the West Indies. Both males and females occur at Soledad during July and August.

Genus Clubiona Latreille 1804

Clubiona albicans (Franganillo)

Figures 199, 200, 202

Corinna albicans Franganillo, 1930, p. 30.
Clubiona albicans, ibid., 1934, p. 32, fig. 16; ibid., 1936, p. 113, fig. 60a.

Female. Length, 6.0 mm., ceph. 2.5 mm., abd. 4.0 mm.

Cephalothorax pale yellow, sparsely covered with short hairs, anterior margin only slightly narrowed, thoracic groove short; eyes, cover almost entire width of head, anterior row straight, equidistant, a.m.e. little larger than a.l.e., posterior row little longer than anterior, slightly procurved, eyes subequal, p.m.e. nearer p.l.e. than to each other; quadrangle of median eyes much narrower in front and wider than high; clypeus less than a diameter of a.m.e.; mandibles vertical, no boss, pale with long hairs, rounded, fang groove oblique, superior margin with a fringe of long hairs and four teeth, the third from base of fang the largest, inferior margin with three teeth followed by three very small ones; labium longer than wide, lateral margin of basal third notched; maxillae almost twice as long as labium, tip dilate; sternum pale, oval, almost twice as long as wide, slightly convex, IV coxae almost touching; abdomen oval, twice as long as wide, flesh colored, sparsely covered with long hairs, venter pale, it is impossible to see the opening of spiracle; legs, 4–1–2–3, pale, anterior tarsi and metatarsi scopulate, spines, I and II pairs, tibia, ventral, 2–2–2, lateral, 0, dorsal, 0, metatarsus, ventral, 2 basal, lateral, 0, dorsal, 0, posterior tibiae and metatarsi heavily spined; epigynum, anteriorly a rounded lobe, followed by a T-shaped groove, each side of which near the base, are coiled tubes beneath the skin as figured.

Male. Length, 4.6 mm., ceph. 2.2 mm., abd. 2.5 mm.

Cephalothorax pale, smaller than female; mandibles pale, sparsely

covered with long hairs, vertical, tip narrowed and fang groove oblique, superior margin with four teeth, the third from base of fang the largest, inferior margin with a very small tooth at base of fang followed by two much larger and two or three very small ones; maxillae more dilate than in the female; abdomen and legs same as in the female; spines, I and II pairs, tibia, ventral, 2–2–2, lateral, 1, dorsal, 0, metatarsus, ventral, 2, basal, lateral, 0; palpus pale, not quite as long as cephalothorax, tibia one and a half times as long as patella, patella with a very long spine at tip, tibial apophysis about as long as diameter of joint, straight, parallel with tarsus, ending in a truncate tip.

Allotype ♂ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June 1936, (Darlington).

♂ ♀ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June 1936, (Darlington).

2 ♀ Cuba; San Jose, 31 July, 1931, (Worley).

♀ Cuba; Soledad, April, 1936, (Darlington).

Franganillo's description was based on a slightly larger specimen than any I have seen. The three pairs of spines on the anterior tibiae, none apical, are unusual in American species. In the males there is one lateral spine on the tibia. The number of teeth on the fang groove is also unusual. F.O.P. Cambridge describes a few species from Central America with three pairs of spines on the first tibia but one pair is apical and very small. *Clubiona crocata* Cambridge has a similar palpus but the tibial apophysis is longer than the tibia.

Clubiona carlota spec. nov.

Figure 206

Female. Length, 5.5 mm., ceph. 2.2 mm., abd. 3.2 mm.

Cephalothorax pale brown, cephalic portion darker, thoracic groove distinct; eyes cover more than two-thirds width of head, anterior row straight, a.m.e. slightly larger than a.l.e., separated by a diameter and from a.l.e. by a little less, posterior row little longer than anterior, slightly procurved, p.m.e. largest of the eight, separated by two diameters and from p.l.e. by less; quadrangle of median eyes narrower in front and wider than high; clypeus less than diameter of a.m.e.; mandibles long and slightly swollen at base, no boss; superior margin of fang groove with three teeth, first two small and the third one large, inferior margin with three small subequal teeth, scopula on superior margin only, fang small; labium little longer than wide, lateral margins

at base only slightly excavate; maxillae one and a half times as long as labium, dilated at tip with a broad, convex upper margin; sternum pale yellow, oval, three-quarters as wide as long, fourth coxae separated by a diameter; abdomen yellowish-gray with six pairs of median dark spots on posterior half, and five or six diagonal lines on sides as in *Clubiona excepta* Hentz, venter pale; spinnerets long, posterior pair very long, terminal joint conical; legs, 4–1–2–3, I pair, 5.0 mm. long, pale yellow without markings, spines long, black and conspicuous, I pair, femur, 6 dorsal spines, patella, 0, tibia, ventral, 2–2–2, basal and middle pairs long, lateral, 0, metatarsus, ventral, 2 basal, half the length of joint, scopula on tarsi and metatarsi on I and II pairs, spines on II pair same as on I pair, III and IV patellae with 1 lateral spine, posterior tibiae and metatarsi with many unpaired spines; epigynum large and dark.

Holotype ♀ Cuba; Trinidad Mountains, Mina Carlota, 25 March, 1925, (Salt and Myers).

Paratypes 2 ♀ Cuba; Sierra de Cobre, Loma del Gato, 2,600–3,325 feet, (Bruner).

This species is among those having three pairs of spines beneath the first tibia, but the epigynum is much larger and darker than in *Clubiona albicans* (Frang.) and it differs in the number of teeth on the fang groove as well as in the abdominal markings.

Clubiona crinophora Franganillo

Figure 196

Clubiona crinophora Frang., 1934, p. 32, fig. 17; also 1936, p. 114, fig. 61.

Female. Length, 6.5 mm., ceph. 3.0 mm., abd. 3.6 mm.

Cephalothorax pale, much darker about anterior margin, thoracic groove short; eyes cover four-fifths of head, anterior row slightly procurved, subequal and equidistant, posterior row slightly procurved, little longer than anterior, eyes subequal, p.m.e. little nearer p.l.e. than to each other, quadrangle of median eyes much narrower in front and wider than high; clypeus less than diameter of a.m.e.; mandibles pale brown, vertical, no boss, fang groove oblique, superior margin with row of four minute teeth followed by one large one, inferior margin with four or five minute teeth; labium longer than wide, lateral margins at base excavate, tip narrower than base and rebordered; maxillae twice as long as labium, tip dilate; sternum pale, two-thirds as wide as long, little wider than labium anteriorly and pointed between

fourth coxae; abdomen oval, pale, posterior half with indistinct chevrons, venter pale; spinnerets, superior pair longer than inferior, very slender; legs, 4–1–2–3, pale, tarsi and metatarsi of anterior pairs with iridescent scopula, slight scopula on distal half of tibiae, spines, I and II pairs, tibia, ventral, 2–2, lateral, 0, metatarsus, ventral, 2, basal, lateral, 0, III tibia, ventral, 1–1, serial; epigynum longer than wide, with a faintly lobed dark lip anteriorly, followed by paired, converging, dark convoluted tubes beneath the skin which meet just above the fold, the openings are probably in the last coil, separated by three or four diameters.

♀ Cuba; Trinidad Mountains, Hanabanillo Falls, 30 April 1938, (Darlington).

The type is from the Sierra de los Organos and is a little larger than the specimen described. Also the number of teeth on the two margins of the fang groove does not agree with the description. F.O.P. Cambridge states in the description of the genus in the Biol. Centr. Amer., that the number of teeth is not constant, and often varies between the right and left mandible of the same specimen. According to Simon, Hist. Nat. Araignées, the genus can be divided by the number of ventral spines on the third tibia. The iridescent scopula on the anterior tibiae is quite conspicuous.

Clubiona elaver spec. nov.

Figure 208

Female. Length, 10.5 mm., ceph. 4.0 mm., abd. 6.0 mm.

Cephalothorax light brown, much darker about anterior portion, long, very little narrowed, thoracic groove distinct; eyes cover more than three-quarters of anterior margin, anterior row straight, eyes subequal, a.m.e. slightly nearer each other than to a.l.e., posterior row longer than anterior, straight, eyes subequal and equidistant; quadrangle of median eyes narrower in front and wider than high; clypeus, less than diameter of a.m.e.; mandibles dark chestnut-brown, hairy, geniculate, boss distinct, fang groove slightly oblique, superior margin with four teeth, inferior with three; labium dark brown, almost twice as long as wide, tip slightly notched; maxillae dark brown, not twice as long as labium, tips much widened; sternum pale, oval, almost twice as long as wide, and pointed in front of IV coxae which are separated by less than a diameter; abdomen dirty white with no markings, sparsely covered with dark hairs of two lengths, venter pale, opening of tra-

cheal spiracle directly in front of spinnerets, colulus present, superior pair of spinnerets slender, twice as long as inferior pair with terminal joint distinct; legs, 4–1–2–3, pale, thinly covered with short, dark hairs, anterior tarsi and metatarsi with a heavy iridescent scopula which is less dense on distal half of tibiae, spines, anterior patellae, 0, posterior patellae, 1 retrolateral, I pair, tibia, ventral, 2–2, lateral, 0, dorsal, 0, metatarsus, ventral, 2, basal, lateral, 0, dorsal, 0; epigynum large and dark, as long as wide, with a hairy median septum with a rounded tip that almost reaches the fold, distal half dark, on each side of which are very dark folds and crevices, all heavily chitinized.

Holotype ♀ Cuba; Coast below Pico Turquino, June 1936, (Darlington).

In 1898, O.P. Cambridge, in the Biol. Centr. Amer., 1, p. 238, established the genus *Elaver* for four species that have since been placed in *Clubiona*. It was separated from males of *Clubiona* by the number of spines on the anterior tibiae, three pairs and a single prolateral spine near the base, and by the short but distinct terminal joint of the superior spinnerets. Only one male is known but the three females referred to this genus, have a median hairy lobe in the epigynum. *Clubiona elaver* has the same hairy lobe much longer and heavier than any of the Central American species. The number of spines on the anterior tibiae may be a sexual character. This species is larger than any of the genus reported from Cuba and the epigynum is very distinct.

Clubiona juana spec. nov.

Figures 201, 203, 204

Female. Length, 6.5 mm., ceph. 2.8 mm., abd. 4.0 mm.

Cephalothorax light brown, much darker about the eyes, thoracic groove short; eyes cover three-quarters of head, anterior row straight, a.m.e. largest of the eight, separated by a diameter and from a.l.e. by about a radius, posterior row longer than anterior, slightly procurved, eyes subequal, p.m.e. separated by more than two diameters and from p.l.e. by less; quadrange of median eyes narrower in front and not as high as wide; clypeus equal to radius of a.m.e.; mandibles dark brown, slightly swollen at base, no boss, superior margin of fang groove with three teeth, middle one large, inferior margin with four graduated teeth, scopula on superior margin only; labium brown, longer than wide, lateral margins deeply excavate at base; maxillae almost twice as long as labium, tips widened and upper margin almost straight;

sternum pale, oval, three-fifths as wide as long, fourth coxae separated by half a diameter; abdomen light gray at base shading to a dark brown at tip, indistinct chevrons on posterior half, venter pale; spinnerets, anterior pair contiguous, terminal joint short, posterior pair longer and more slender, terminal joing short; legs, 4–1–2–3, pale, I and II pairs with iridescent scopula on tarsi, metatarsi and half of tibiae, spines, I pair, tibia, ventral, 2–2, on basal half, lateral, 0, dorsal, 0, metatarsus, ventral, 2, basal, more than half the length of the joint, lateral, 0, III tibia, ventral, 0, IV tibia heavily spined; epigynum large and dark, with a median basal lobe, very broad and short, below are two parallel, distinct ridges.

Male. Length, 6.2 mm., ceph. 3.0 mm., abd. 4.0 mm.

Cephalothorax pale, much darker about eyes; eyes same as in female; mandibles slightly flattened in front with colorless hairs, fang groove long and oblique; superior margin with one large tooth and one small one, inferior margin with three or four small teeth, scopula on superior margin only; labium longer than wide, lateral margins at base deeply notched; maxillae twice as long as labium; abdomen pale, darker at tip, with indistinct chevrons on posterior half, venter pale; spinnerets, inferior pair contiguous, superior pair longer and more slender; legs, I and II left and III right missing, much longer and more slender than in female; spines on anterior tibiae and metatarsi are much longer, no lateral spines, iridescent scopula on tarsi and metatarsi; palpus, tibia nearly twice as long as patella, tibial apophysis dark with a broad base, the apical third constricted in a point that diverges from the palpus, palpal organ very similar to *Clubiona tricuspis* Cambridge and *Clubiona portoricensis* Petrunkevitch.

Holotype ♀ Cuba; Soledad, garden, found in a dead banana leaf, 12 August, 1931, (Worley).

Allotype ♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).

Paratype ♀ Cuba; Soledad, February, 1925, (Salt).

Paratype ♀ Cuba; Soledad, 21 July, 1933, (Weber).

The male was not found with the female but is from the same locality, and the difference in the mandibles is probably only sexual. Both have the indistinct chevrons on the posterior half of the abdomen, the labium deeply notched at the base, and the heavy, iridescent scopula on the anterior tarsi and metatarsi. It is related to *Clubiona tigrina* Cambridge from Orizaba, Mexico, and *Clubiona tumivulva* Banks from Costa Rica but is smaller than either of these species. It is larger than *Clubiona portoricensis* Petrunkevitch, and both palpus and epigynum are different.

Clubiona maritima L. Koch

Figures 205, 207

Clubiona maritima L. Koch, 1867, p. 310, pl. 12, fig. 198.

Female. Length, 8.0 mm., ceph. 4.0 mm., abd. 4.0 mm.

Cephalothorax pale yellow, dark brown about the eyes, thoracic groove distinct; eyes cover four-fifths of head, anterior row straight, a.m.e. separated by a radius and from a.l.e. by two diameters, posterior row longer than anterior, slightly procurved, eyes subequal and equidistant; quadrangle of median eyes much narrower in front and wider than high; clypeus very narrow, about equal to radius of a.m.e.; mandibles dark brown, distinctly geniculate, no boss, superior margin of fang groove with three teeth, middle one largest, inferior margin with three equidistant teeth, scopula on upper margin only; labium dark brown, twice as long as wide, tip emarginate; maxillae dark brown, one and a half times as long as labium, tips widened to form a distinct angle on outer margin, upper margin oblique; sternum pale yellow, oval, fourth coxae separated by less than half a diameter; abdomen gray, covered with yellowish-white hairs, very slender, venter dark gray; legs, 4–1–2–3, pale yellow, spines black, spines, I and II pairs, tibia, ventral, 2–2, on basal half, long, lateral, 0, dorsal, 0, metatarsus, ventral, 2, basal, half the length of the joint, lateral, 0, dense scopula on anterior tarsi and metatarsi, III tibia, ventral, 1–1, spines, III metatarsus with preening comb; epigynum a long, transverse slit, showing no structure.

Male. Length, 7.0 mm., ceph. 3.5 mm., abd. 3.5 mm.

Paler than female and eye area is hardly darkened; eyes same as in female; mandibles not geniculate, no boss, teeth on fang groove same as in female; legs, spines same, with no lateral spines on tibiae or metatarsi; palpus, patella about as long as broad with a dark ventral lobe at apex, tibia little longer than patella with a broad truncate dorsal apophysis, wider at tip than at middle, tip rests against a prominent lobe or conical swelling on the upper side of the cymbium, the tip of the apophysis is bi-lobed and the outer corner prolonged, two lateral apophyses are parallel, palpal organ fills the entire cavity, embolus a slender inconspicuous black line follows the contour of the cavity and ends in a semicircle at the distal third.

Allotype ♂ Cuba; Soledad, garden, under water lily leaves, 12 August, 1931, (Worley).

♂ ♀ Cuba; Soledad, garden, August, 1931, (Worley).

♀ Cuba; Santiago de las Vegas, Banks Coll.
2 ♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).
♂ Cuba; Soledad, April, 1936, (Darlington).

The type, a female, was from St. Thomas and is in the Keyersling Collection at the British Museum. Petrunkevitch found a female in the Virgin Islands. Undoubtedly it is near *Clubiona crocata* Cambridge from Teapa, Tabasco, Mexico. The latter is figured with a very long embolus and without the two lateral apophyses. The dorsal spur is described "as longer than tibia and deeply bifid at apex." It is even nearer the males of *Clubiona tibialis* Emerton found in New England and to *Clubiona transversa* Bryant from Texas. The females of these three species can be easily separated by the epigynum but the males differ little except in size.

Sub-family ANYPHAENINAE

Genus Anyphaena Sundevall 1833.

Anyphaena bispinosa spec. nov.

Figures 211, 221

Male. Length, 5.0 mm., ceph. 3.0 mm., abd. 2.2 mm.

Cephalothorax pale with dark veins behind eyes which meet and form vague dark stripes that extend near the posterior margin, these stripes are crossed by dark radial striae, slightly emarginate above coxae, thoracic groove short, anterior margin less than half the greatest width; eyes, anterior row straight, almost touching, a.m.e. less than half the diameter of a.l.e., posterior row longer than anterior, straight, eyes subequal and equidistant, separated by less than a diameter; quadrangle of median eyes narrower in front and higher than wide; clypeus less than diameter of a.m.e.; mandibles pale, cone-shaped, fang groove oblique, superior margin with a row of bristles, inferior margin with many minute teeth; labium longer than wide, lateral margins at base excavate; maxillae twice as long as labium, sides parallel; sternum pale, triangular, more than twice as long as wide, ending in a blunt point between IV coxae which are separated by almost a diameter; abdomen oval, pale, heavily spotted with brown, at base a pair of heavy spots and a pair of irregular large spots just behind the middle, venter pale, with a faint median gray stripe, opening of trachael spiracle one-third nearer fold than to spinnerets; legs, 1–2–4–3, pale, posterior tibiae darker, legs very long, with long

conspicuous spines, II and III coxae modified by a small heavily chitinized hook near tip, the hook surrounded by short hairs with a smooth area to base, I and IV coxae with short, stiff hairs, spines, I and II pairs, femur, 1 long prolateral spine near tip, tibia, ventral, 2–2, lateral, 3, metatarsus, ventral, 2–2, lateral, 3, spines on III pair not modified, metatarsus with a median and distal whorl of spines; palpus longer than cephalothorax, femur slightly enlarged, tibia one and a half times longer than patella, tip of patella heavily chitinized with a long slender spine, tibial apophysis a short triangular lobe against which a chitinized lobe of the tarsus rests, cymbium with two long heavy recurved spines on inner side near tip.

Female. Length, 5.6 mm., ceph. 3.0 mm., abd. 3.2 mm.

Cephalothorax pale with median area from posterior eye row shaded with dark gray, radial striae dark, black lines on margin; eyes same as in male; mandibles pale, shaded with gray, superior margin of fang groove with four teeth, inferior with many small teeth; labium, maxillae and sternum same as in male; coxae not modified but on II and III coxae a small lobe where in male there is a hook; abdomen so thickly covered with brown spots that it appears brown, a pair of basal marks and a larger pair of spots just behind the middle as in male, venter light with pale brown spots, opening of tracheal spiracle one-third nearer the fold than to spinnerets; legs, 1–2–4–3, pale with faint dark rings on all joints, spines, I and II pairs, femur, 1 long prolateral spine near tip, tibia, ventral, 2–2, lateral, 3, metatarsus, ventral, 2–2, lateral, 3, spines on III pair not modified; epigynum more than twice as wide as long, opening a transverse oval, lightly chitinized directly anterior to a pair of bean-shaped sacs, almost touching with tubes extending upward from the exterior ends.

Holotype ♂ Cuba; South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Allotype ♀ Cuba; South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Paratypes 2 ♂ Cuba; South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Paratype ♀ Cuba; Pico Turquino, 6,000 feet, 16–17 June, 1936, (Darlington).

Anyphaena bispinosa belongs to the section of the genus in which the coxae of the male are modified. In the palpus the two large spines at the tip of the cymbium are very conspicuous, as well as the chitinized lobe of the cymbium which rests against the tibial apophysis. The epigynum can be recognized by the broad oval opening just anterior

to the dark bean-shaped sacs beneath the skin. In the Biol. Centr. Amer. most of the females belonging to this group have the epigynum longer than wide.

Anyphaena darlingtoni spec. nov.

Figures 212, 214, 216, 219

Male. Length, 6.0 mm., ceph. 2.9 mm., abd. 3.0 mm.

Cephalothorax pale yellow with patches of very short gray hairs about the radial striae and anterior to the thoracic groove, anterior margin less than half the greatest width, carapace only moderately rounded; eyes cover two-thirds width of head, anterior row slightly recurved, almost touching, a.m.e. less than half a diameter of a.l.e., posterior row little longer than anterior, slightly procurved, eyes subequal and equidistant, lateral eyes subequal and almost touching; quadrangle of median eyes much narrowed in front and higher than wide; clypeus less than diameter of a.m.e.; mandibles vertical, fang groove short, inferior margin with several very minute teeth; labium nearly twice as long as wide, lateral margins on basal half excavate; maxillae not quite twice as long as labium, base narrow, widened on outer margin to more than twice width at base, with a rounded tubercle that extends outside the plane; sternum pale, oval, ending in a point between IV coxae, anterior margins of II and III coxae thickly covered with fine hairs; abdomen pale, oval, with a few stiff hairs at base, no markings, venter pale, tracheal spiracle slightly nearer fold than to spinnerets, a lightly chitinized recurved line; legs, 1–2–4–3, pale, anterior tibiae and metatarsi darker, posterior tibiae and metatarsi with faint basal, median and distal dark rings, anterior metatarsi and tarsi scopulate, III femur on ventral side with a long, low tubercle near base, thickly covered with short, stiff bristles, metatarsus with distinct cusps on ventral side, most numerous near the base, each bearing a long hair; spines, anterior patella, 1 at apex, 2 lateral, tibia, ventral, 2–2, basal and median, lateral, 3, metatarsus, ventral, 2–2, lateral, 3, all very long, III metatarsus, ventral, 2, basal, and a retrolateral spine more than half the length of the joint, median and distal whorls, the distal whorl is what Petrunkevitch calls the preening comb; palpus about as long as cephalothorax, pale, patella and tibia subequal, a very long spine at tip of patella, tibia with a cluster of bristles about as long as diameter of joint in a slight excavation that is half covered on ventral side by a transparent membrane connected to the ventral spur, palpal organ of the usual type as figured.

Female. Length, 6.5 mm., ceph. 3.1 mm., abd. 3.5 mm.

Cephalothorax pale with the short hairs in four vague lines, anterior margin not narrowed as much as in the male; eyes same as in male; mandibles slightly swollen, inferior margin of fang groove with several small teeth; labium pale, twice as long as wide; maxillae not twice as long as labium, inner margin slightly emarginate, outer evenly rounded with no indication of tubercle found in male; abdomen pale with faint gray marks, in life probably covered with short dark hairs, tracheal spiracle slightly anterior to the middle of the venter; legs, 1–2–4–3, I left missing, pale, posterior tibiae and metatarsi with faint basal, median and distal dark rings, more conspicuous because of dark spines, anterior tarsi and metatarsi with iridescent scopula, anterior pairs spined as in male; III femur with long hairs but no cusps on the metatarsus; epigynum as figured.

Holotype ♂ Cuba; Mountains North of Imias, 3,000–4,000 feet, 25–28 July, 1936, (Darlington).

Allotype ♀ Cuba; Mountains North of Imias, 3,000–4,000 feet, 25–28 July, 1936, (Darlington).

This species is named for Dr. P. J. Darlington. It differs from most of the other species of the genus by the slightly procurved posterior eye row and by the various secondary characters of the male. The modified maxillae, the elongate ventral cone or ridge on the III femur covered with short, stiff bristles, the long hairs from cusps on the metatarsus, and the cluster of bristles on the tibia of the palpus are all distinctive. The unmatched basal pair of spines on the ventral side of the III metatarsus may be found in other species.

Anyphaena diversa Bryant

Anyphaena diversa Bryant, 1936, p. 330, pl. 23, fig. 7.

This species is known only from the female found in the Sierra del Cobre. The epigynum is wider than long, the openings are widely separated, anterior to two bean-shaped sacs beneath the skin.

Holotype ♀ Cuba; Sierra de Cobre, Loma del Gato, 2,600–3,325 feet, (Bruner).

Anyphaena insulana spec. nov.

Figures 193, 210

Male. Length, 4.0 mm., ceph. 2.0 mm., abd. 2.0 mm.

Cephalothorax pale, lightly shaded with gray on radial striae,

thoracic groove short; eyes cover four-fifths of anterior margin, anterior row straight, eyes equidistant, a.m.e. less than one-third diameter of a.l.e., posterior row straight, a little longer than anterior row, eyes subequal and equidistant, lateral eyes separated by less than a radius of a.l.e.; quadrangle of median eyes much narrower in front and higher than wide; clypeus below a.l.e. about half the diameter of a.l.e.; mandibles shaded with gray, with a few long hairs, vertical, fang groove short, two or three teeth on superior margin of fang groove, four or five minute teeth on inferior margin; labium one-third longer than wide, lateral margins on basal half excavate; maxillae nearly twice as long as labium, about twice as long as wide, outer margins with a few stiff hairs; sternum pale, three-quarters as wide as long, ending in a broad lobe between IV coxae, II and III coxae with a chitinized transverse ridge near tip; abdomen pale with the usual gray lines on sides and posterior half with dark gray blotches across the middle, venter pale, openings of tracheal spiracle midway between fold and spinnerets; legs, 1–2–4–3, pale, spines dark, spines, I pair, tibia, ventral, 2–2, lateral, 3, metatarsus, ventral, 2–2, lateral, 3, III pair, tibia, ventral, 1 distal, 2 median, 2 basal, spines not modified; palpus pale, tibia very little longer than patella, (4.0 : 3.0), patella with a very long bristle from chitinized tip, tibial apophysis blunt, joint excavate, below excavation are long dark hairs, and directly below these are short stout hairs, palpal organ of the usual type, two long curved bristles near the tip of cymbium.

Female. Length, 4.0 mm., ceph. 2.0 mm., abd. 2.4 mm.

Cephalothorax pale with two faint gray stripes from posterior eye row to margin; eyes, mandibles, labium, maxillae and sternum as in the male; II and III coxae not modified; abdomen with same markings as in the male but heavier; legs, III right and IV left missing, pale, with an interrupted dark band on IV tibia, spines, I and II pairs, tibia, ventral, 2–2, lateral, 3, metatarsus, ventral, 2–2, lateral, 3, III tibia, ventral, 1–1 in series and 1 distal, 2 lateral, metatarsus, ventral, 3 whorls, basal, median and distal; epigynum, a pair of transverse bean-shaped dark sacs, almost touching, beneath the skin and just anterior to the fold, from the outer ends are convoluted tubes with openings apparently about the middle of the area, on the outside, above the sacs is a semicircular, clear depressed area faintly outlined.

Holotype ♂ Cuba; Pico Turquino, 6,000 feet, 16–17 June, 1936, (Darlington).

Allotype ♀ Cuba; Pico Turquino, 6,000 feet, 16–17 June, 1936, (Darlington).

The female of this species is very near *Anyphaena diversa* Bryant, known only from the female. In that species, the tubes of the epigynum are a simple curve with the openings at the ends, the light area anterior is very much reduced, and is half covered by a chitinized lobe at the margin. *Anyphaena insulana* is also related to *Anyphaena bispinosa* spec. nov. The males have the III and IV coxae modified, in *A. insulana* with a transverse ridge, and in *A. bispinosa* with a hook and modified hairs. In the male palpus of *A. bispinosa*, the tibia is almost twice as long as the patella and is bare of hair or spines below the tibial lobe, in *A. insulana* the tibia is shorter and below the tibial lobe, the joint is sharply excavate and there are clusters of two kinds of hairs.

Genus Anyphaenella Bryant 1931

Anyphaenella longipes spec. nov.

Figures 213, 217, 220

Male. Length, 4.0 mm., ceph. 2.5 mm., abd. 2.5 mm., I leg, 20.5 mm.

Cephalothorax pale straw-color, eyes surrounded by black rings, nearly as wide as long, cephalic margin less than half the greatest width, thoracic groove short; eyes before the last moult: the right lateral eyes were injured, anterior row slightly recurved, equidistant, a.m.e. smallest of the eight, less than one-third diameter of a.l.e. and separated by a diameter of a.m.e., posterior row procurved, little longer than anterior row, p.m.e. largest of the eight, little more than a diameter apart, and about a diameter from p.l.e., p.l.e. smaller than a.l.e., and separated from them by a radius of p.l.e.; quadrangle of median eyes narrower in front and higher than wide; a.m.e. on margin so that clypeus is wanting; mandibles vertical and rather small, few hairs, fang groove oblique, teeth on superior margin can not be seen because of dense scopula, two minute teeth on inferior margin; labium pale, two-thirds as wide as long, lateral margins on basal half slightly indentate; maxillae not quite twice as long as labium, more than twice as long as wide, sides almost parallel; sternum pale, triangular, widest between II coxae, IV coxae separated by less than a diameter; abdomen pale and slightly crushed, openings of tracheal spiracles nearer fold than to spinnerets; legs, pale and very long, I pair,

femur	patella plus tibia	metatarsus	tarsus	total
5.0 mm.	7.5 mm.	5.5 mm.	2.8 mm.	20.8 mm.

spines, femur, dorsal, 3, lateral, 2, tibia, ventral, 2–2, lateral, 3, metatarsus, ventral, 2–2, lateral, 3, scant scopula on I and II tarsi, III coxae, anterior margin chitinized bearing a row of short bristles and a large patch of spicules, IV coxae slightly roughened; palpus longer than cephalothorax, femur, 1.2 mm., tibia twice as long as patella, 1 very long bristle at tip of patella and a shorter one at base, tibia not as long as terminal joint, 1 long, heavy bulbus spine two-thirds length of joint from a raised base on dorsal side at base, and a small lobe on ventral side just above the base, a thick mass of long hairs from lobe to end of joint; palpal organ very simple with a small spur or tooth beneath the embolus.

Female. Length, 6.0 mm., ceph. 2.5 mm., abd. 3.6 mm.

Coloring, eyes and spines on legs same as in male; legs not quite as long, I pair,

femur	patella plus tibia	metatarsus	tarsus	total
3.5 mm.	4.6 mm.	3.0 mm.	2.0 mm.	13.1 mm.

spines long and overlapping on anterior pairs, a distinct preening comb on III metatarsus; tracheal spiracle slightly nearer fold than to spinnerets; epigynum, openings very lightly defined but apparently widely separated, anterior to a pair of oblong, transverse dark bodies beneath the skin.

Holotype ♂ Cuba; Los Negros, Jiquani, 1913, (Barbour and Shaw).

Allotype ♀ Cuba; Soledad, 10 March, 1925, (Salt).

Paratype ♂ Cuba; Oriente, Yunque de Baracoa, 1,000–1,800 feet, 13 July, 1936, (Darlington).

Paratype ♂ Cuba; Trinidad Mountains, Buenos Aires, 2,500–3,500 feet, 9 May, 1936, (Darlington).

The genus *Anyphaenella* was separated from *Anyphaena* because of the very long anterior legs. Both species originally placed in it, have the tibia of the palpus modified by a long spine or spur at the base on the dorsal side. The spines on the legs are difficult to trace if broken, as they are slender, and the scar is often hard to find.

Genus Aysha Keyserling 1891

Aysha gracilis (Hentz)

Clubiona gracilis Hentz, 1847, p. 452, pl. 23, fig. 19
Anyphaena gracilis, L. Koch, 1866, p. 195, pl. 8, fig. 130.
Aysha striata, Banks, *nec* Becker, 1909, p. 158.
Aysha gracilis, Bryant, 1931, p. 119, pl. 7, fig. 13, pl. 8, fig. 26.

This species is found from Massachusetts west to Nebraska, and south to Florida.

♀ Cuba; Santiago de las Vegas, (Horne and Houser), Banks Coll.

Aysha turquinensis spec. nov.

Figure 209

Female. Length, 7.0 mm., ceph. 3.0 mm., abd. 4.0 mm., I leg 23.0 mm. long.

Cephalothorax pale, in life probably covered with fine short hairs now brushed off except on sides, thoracic groove very short, carapace slightly convex, three-quarters as wide as long, anterior margin less than a quarter of greatest width; eyes cover entire anterior margin, anterior row straight, equidistant, a.m.e. very small, posterior row procurved, longer than anterior, eyes equidistant, p.m.e. slightly larger than p.l.e., lateral eyes subequal and separated by less than a diameter; quadrangle of median eyes much narrower in front and higher than wide; clypeus less than diameter of a.l.e.; mandibles pale with many long hairs, long, vertical, fang groove oblique, four large teeth on superior margin and eight or nine minute teeth on inferior margin, fang rather long and evenly curved; labium pale, one-third longer than wide, tip emarginate and lateral margins on basal half excavate; maxillae about twice as long as wide, lateral margins slightly convex and tips not dilate; sternum pale, three-quarters as wide as long, ending in a hairy lobe between IV coxae; abdomen pale with many short hairs and fewer long hairs, twice as long as wide, venter pale, opening of tracheal spiracle one-fourth nearer fold than spinnerets, colulus present; legs, I right missing, pale, with no markings, anterior tarsi and metatarsi with iridescent scopula, I pair very long, spines, I and II pairs, tibia, ventral, 2–2, lateral, 3, metatarsus, ventral, 2–2, lateral, 2, spines on III tibia not modified; epigynum, a transverse oval depression with lateral margins chitinized, below are transverse tubes, probably twisted, which lead to dark sacs, half way to fold.

Holotype ♀ Cuba; Pico Turquino, 1,500 feet, 25 June, 1936, (Darlington).

Paratype ♀ Cuba; Mountains north of Imias, 3,000–4,000 feet, 25–28 July, 1936, (Darlington).

The position of the tracheal spiracle, and the very long first pair of legs places this species in *Aysha*.

Aysha velox (Becker).

Anyphaena velox Becker, 1879, p. 83, pl. 2, figs. 5–7.
Aysha velox, Bryant, 1931, p. 119, pl. 7, fig. 14, pl. 8, fig. 34.

Originally described from Mississippi, this species has been found in Florida, Bermuda, and Panama. It is evidently very common in Cuba from the number in collections.

♂ ♀ Cuba; Soledad, June, July 1925, (Salt).
♂ ♀ Cuba; Soledad, August, 1931, (Worley).
♀ Cuba; Soledad, San Jose, 1 August, 1931, (Worley).
♂ ♀ Cuba; Havana, Banks Coll.

Genus Oxysoma Nicolet 1849.

Oxysoma cubana Banks

Figures 218, 222, 234

Oxysoma cubana, Banks, 1909, p. 157, pl. 45, fig. 7.
Aysha tenuis, Banks, *nec* Koch, ibid., p. 158, ♀.

Female. Length, 7.0 mm., ceph. 3.2 mm., abd. 4.0 mm.

Cephalothorax yellowish-brown, quite flat, two-thirds as wide as long, anterior margin less than half the greatest width, abruptly narrowed in front of first coxae, sides evenly rounded, thoracic groove long and sharply defined, three pairs of black spots above the thoracic margin, eyes on black spots; eyes cover three-quarters width of head, anterior row slightly recurved, equidistant, a.m.e. very small, separated by about a radius, posterior row longer than anterior, strongly procurved, eyes subequal, p.m.e. separatedby more than two diameters and from p.l.e. by about a diameter and a half, lateral eyes subequal and separated by more than a diameter; quadrangle of median eyes much narrower in front and higher than wide; clypeus below a.m.e. about equals diameter of a.l.e.; mandibles vertical, long, slightly attenuate with many long hairs, fang groove oblique, superior margin with three teeth, inferior margin with two teeth; labium slightly longer than wide, tip rebordered, lateral margins on basal third excavate; maxillae more than twice as long as labium, sides almost parallel, tip not widened; sternum pale, oval, anteriorly narrowed to width of labium, IV coxae separated by half a diameter; abdomen pale yellow, three times as long as wide, venter pale, opening of spiracle about

midway between fold and spinnerets; legs, 4–1–2–3, pale with elongate black spots on dorsal sides, irregularly placed, spines, I pair, patella, 0, tibia, dorsal, 0, ventral, 2–2–2, apical pair small, lateral, 2, metatarsus, ventral, 2, basal pair half the length of the joint, lateral, 0, II pair same as I pair, scopula on all tarsi and metatarsi but much heavier on anterior pairs; epigynum twice as long as wide, openings widely separated.

Male. Length, 6.0 mm.

Coloring same as in female, except that the dark spots on anterior legs are smaller and less numerous; eyes and legs the same as in female; palpus shorter than cephalothorax, tibia about as long as wide and only slightly larger than patella, without dorsal or ventral apophyses, terminal joint longer than tibia plus patella, palpal organ complicated, embolus a slender black tube transverse across the middle and three small apophyses near the tip, one, a transparent lobe that extends outside the cymbium and two black spines that are parallel to the margin, the upper half of the cavity is almost filled with a large leaf-like lobe with a broad, recurved tip under which is a small and very black spine.

Holotype ♂ Cuba; Havana, (Baker), Banks Coll.

Allotype ♀ Cuba; Santiago de las Vegas, (Horne and Houser), Banks Coll.

The genus *Oxysoma* is South American, and apparently all the species are spotted. This Cuban species differs from the genotype by the size of the lateral eyes and the subequal posterior eyes.

Genus Temnida Simon 1897

Temnida perpusilla (Banks)

Figure 215

Anyphaena perpusilla Banks, 1909, p. 158, pl. 45, fig. 9.

Female. Length, 2.6 mm.

Cephalothorax pale, moderately convex, cephalic portion not much narrowed, thoracic groove short; eyes cover about two-third width of head, anterior row slightly recurved, a.m.e. smallest of the eight, less than one half the diameter of a.l.e., separated by about a diameter and from a.l.e. by a radius, posterior row slightly longer than anterior, straight, eyes subequal and equidistant, separated by a full diameter, lateral eyes separated by a diameter of p.l.e.; quadrangle of median

eyes narrower in front and higher than wide; clypeus very narrow, less than diameter of a.m.e.; mandibles reddish-brown, vertical, slightly attenuate, no boss; because of the small size and the many hairs the number of teeth on the fang groove can not be counted, fang short; labium slightly longer than wide, tip rebordered, lateral margins at basal third notched; maxillae more than twice as long as labium, slightly dilate at tip; sternum oval, widest between second coxae, fourth coxae separated by a diameter; abdomen paler than cephalothorax, twice as long as wide, venter pale, opening of tracheal spiracle inconspicuous, midway between fold and spinnerets; legs very pale, 4–3–1–2, spines, I pair, femur, 2 very long dorsal spines, tibia, ventral, 2–2–2–2–2, each from a raised base, long and over lapping, lateral, 0, metatarsus, ventral, 2–2, long and overlapping, lateral, 0, II pair same as I pair except tibia, ventral. 2–2–2–2, few spines on posterior pairs; epigynum, openings widely separated directly anterior to fold, with a triangular median area evidently of coiled tubes.

Holotype ♀ Cuba; Santiago de las Vegas, (Horne and Houser), Banks Coll.

Paratype ♀ Cuba; Santiago de las Vegas, Banks Coll.

Simon founded this genus for two small species from Venezuela. It differs from others in the section by the raised spines on the anterior tibiae and metatarsi, similar to those found in *Phrurolithus*. It is another example of a genus that is restricted at present to Venezuela and Cuba.

Genus Wulfila O.P. Cambridge 1896

Wulfila immaculata Banks

Wulfila immaculata Banks, 1914, p. 640, pl. 43, fig. 7; Petrunkevitch, 1930, p. 85, fig. 72.

This species was described by Mr. Banks from specimens from Vinales, Cuba, Puerto Rico and Mona from the collection in the American Museum of Natural History. A female from Siboney agrees with the original description and the more detailed one given by Petrunkevitch with one exception. The Cuban specimen has on the prolateral margin of the mandibles two or three transverse parallel ridges chitinized from the base for about one-quarter of the entire length. In a recently moulted specimen, these ridges could be easily overlooked as they were not mentioned by Banks or Petrunkevitch,

who had the specimen from Mona. The epigynum agrees with the figures previously given. Franganillo evidently had no new record.

♀ Cuba; Siboney, (Ferrer).

Wulfila tricuspis spec. nov.

Figure 223

Male. Length, 5.0 mm., ceph. 2.0 mm., abd. 3.1 mm.

Cephalothorax pale yellow, three-quarters as wide as long, head very much narrowed, so that anterior margin is less than a third of the greatest width, thoracic groove very indistinct; eyes almost cover the narrow lobe that is carried foreward, anterior row recurved, a.m.e. very small, separated by less than a diameter and from a.l.e. by about a diameter, posterior row a little longer than anterior, procurved, eyes subequal, p.m.e. separated by a diameter and a half and from p.l.e. by about a radius of p.l.e.; quadrangle of median eyes very narrow in front and higher than wide; clypeus equals about two diameters of a.m.e.; mandibles pale, small, vertical and weak, no boss, fang groove short, impossible to see teeth; labium white, longer than wide; maxillae white, about twice as long as labium, inner margins parallel, outer margins convex, tips wider than base; sternum white, slightly convex, smooth and shining, heart-shaped, tip extending between IV coxae which are separated by more than a diameter; abdomen white, two and a half times as long as wide, venter white, tracheal spiracle one-third nearer fold than to spinnerets; legs very long, III right and III and IV left missing, pale, 1–2–4, spines, I pair, tibia, ventral, 2–2, lateral, 3, metatarsus, ventral, 2–2, lateral, 2; palpus, white, longer than cephalothorax, tibia slightly longer than patella, patella with two long lateral processes at tip and one dorsal, the retrolateral with a truncate tip, the prolateral as long but ending in a point, the dorsal process much smaller with margins heavily chitinized, tibia curved with a small heavily chitinized apophysis at tip directly below cymbium, palpal organ extends the entire length on cymbium, parts very dark except the embolus at the tip.

Holotype ♂ Cuba; Oriente, Los Llanos, 1,000–2,000 feet, 16–17 July, 1936, (Darlington).

Several species of *Wulfila* have been found in Cuba but most of them are known only from the females. This male is unusual because of the three processes from the patella of the palpus.

Sub-family LIOCRANINAE

Genus Liocranum L. Koch 1866.

Liocranum remotum spec. nov.

Figure 229

Female. Length, 4.0 mm., ceph. 2.0 mm., abd. 2.1 mm.

Cephalothorax chestnut-brown, shining, cephalic portion rather flat, gently rising to thoracic groove where it slopes abruptly to posterior margin, thoracic groove short; eyes, anterior row slightly recurved, a.m.e. slightly smaller than a.l.e., separated by less than a diameter and from a.l.e. by less than a radius, posterior row longer than anterior, recurved, eyes subequal, p.m.e. separated by a little more than a diameter and from p.l.e. by a little less; quadrangle of median eyes narrower in front and higher than wide; clypeus less than diameter of a.m.e.; mandibles dark brown, no boss, vertical, basal half swollen, fang groove oblique, superior margin with three teeth, inferior with two teeth, fang long; labium longer than wide, sides parallel; maxillae but little longer than labium; sternum brown, rebordered, nearly as wide as long, ending in a short point between IV coxae; abdomen dark gray with four pale chevrons on posterior half, venter pale with a long dark spot in middle and an irregular dark line on sides; legs, II right missing, 4–1–2–3, I pair heaviest, brown, shining, few hairs, spines, I and II pairs, patella, 0, tibia, dorsal, 0, lateral, 0, ventral, 2–2–2–2–2, each from a raised base, long, metatarsus, ventral, 2–2, long; epigynum, area as wide as long, openings probably each side of median septum more than their diameter anterior to the fold.

Holotype ♀ Cuba; Sierra de Cobre, 3,000–3,800 feet, 3–7 July, 1936, (Darlington).

Paratype ♀ Cuba; Sierra de Cobre, 3–7 July, 1936, (Darlington).

Liocranum remota does not agree in every character with the typical species. The median pair of spinnerets are not compressed, but until a male is found, it is thought best to place it in this genus. Franganillo has described *Paratyle montana* from the same area: the description is very short, the genus *Paratyle* has the posterior row of eyes procurved, and only two pairs of spines on the anterior tibiae. No size is given.

Genus Phrurolithus C. Koch 1839

Phrurolithus nemoralis spec. nov.

Figures 226, 236

Male. Length, 2.0 mm., ceph. 0.9 mm., abd. 1.0 mm.

Cephalothorax chestnut-brown with a vague gray spot about center, indistinct striae on each side, black between the eyes, five-sixth as wide as long, much narrowed at anterior margin, posterior margin wider than anterior, thoracic groove long and lightly impressed; eyes cover width of head, anterior row procurved, a.m.e. slightly smaller than a.l.e., separated by less than a radius and almost touching a.l.e., posterior row straight, as long as anterior, eyes subequal, p.m.e. white, oval, oblique, separated by less than a radius and from p.l.e. by a little more, lateral eyes separated by a line; quadrangle same width in front and behind, higher than wide; clypeus equal to a diameter and a quarter of a.m.e.; mandibles vertical, with a prominent bristle from a raised base near inner margin directed forward; labium as long as wide, lateral margins slightly notched on basal half; maxillae broad and inclined slightly over labium; sternum triangular, almost as wide as long and very little narrowed anterior to the II pair of coxae, flat, yellowish with a dark margin, IV coxae separated by a diameter; abdomen oval, two-thirds as wide as long, dark brown with no markings, and shining with a coppery iridescence, hairs very small and inconspicuous, venter yellow, shaded with gray, with minute corneous spots; legs, 4–1–2–3, femora dark, I pair darkest, others with distinct lateral stripes, I tibia gray at base, gradually fading at tip, metatarsus and tarsus pale, spines, I pair, all spines from a raised base, tibia, ventral, 2–2–2–2–2, long and overlapping, metatarsus, ventral, 4–3, long and overlapping, II pair, tibia, ventral, 2–2–2–2, metatarsus, ventral, 4–3, no spines on posterior legs; palpus, femur as long as tibia plus patella, with the usual spur directed forward, the tip of spur covered with long hairs, tibial apophysis from near the base, forked, upper branch dark brown, the tip extends to the middle of the bulb, lower branch short, and extends to ventral margin of the tibia, ending in a small incurving hook.

Female. Length, 2.0 mm.,

All characters are the same as in the male, except that the abdomen is larger. The epigynum is very similar to others in the genus, a pair of large dark sacs beneath the skin, separated by less than a diameter with the openings probably beneath a dark angle above.

Holotype ♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).
Allotype ♀ Cuba; Soledad, April, 1936, (Darlington).

The two specimens were taken at different seasons but undoubtedly belong together. The unmarked abdomen, the palpus and the epigynum separate this species from others of the genus. Petrunkevitch described two species, both from females from Puerto Rico. Franganillo has not reported any of the genus.

Sub-family CORINNINAE

Genus Corinna C. Koch 1842

Corinna abnormis Petrunkevitch

Corinna abnormis Petrunk., 1930, p. 103, fig. 86.

One male of this species was found by Petrunkevitch in a house at Rio Piedras, Puerto Rico, January 11, 1926. In a small collection of spiders from Siboney, Cuba, received from Victor Rodriguez Ferrer is also a male. The palpus is very characteristic.

Corinna gracilipes (Keyserling)

Hypsinotus gracilipes Keyserling, 1887, p. 448, pl. 6, fig. 19, ♀.
Corinna gracilipes, Bryant, 1933, p. 192, pl. 3, fig. 32, ♂.

The types are in the collection of the Museum of Comparative Zoology. The female is from Haiti and the male from Florida. Petrunkevitch did not find it in Puerto Rico.

♂ ♀ Cuba; Havana, (Baker), Banks Coll.
♀ Cuba; Isle of Pines, 1918, (Barbour and Brooks).
♀ Cuba; Santiago de las Vegas, Banks Coll.
♀ Cuba; Soledad, June, 1925, (Salt).

Corinna humilis (Keyserling).

Hypsinotus humilis Keyserling, 1887, p. 446, pl. 6, fig. 18; Petrunkevitch, 1930, p. 95, figs. 78, 79.

This species was described from a pair collected at St. Kitts in the collection of the Museum of Comparative Zoology. Petrunkevitch found both sexes in Puerto Rico. Franganillo has not reported it.

♂ Cuba; Soledad, February 1925, (Salt).
♀ Cuba; Pinar del Rio, Herradura, February 1912, (Barbour).
♀ Cuba; Havana, Vedado, June 1927, (Aguayo).

Corinna parvula spec. nov.

Figures 225, 227

Male. Length, 4.5 mm., ceph. 2.2 mm., abd. 2.3 mm.

Cephalothorax reddish-brown, sides roughened, cephalic portion high, very little narrowed, thoracic groove short; eyes cover three-quarters width of the head, anterior row procurved, eyes subequal and equidistant, separated by less than a diameter, posterior row procurved, very little longer than anterior row, eyes subequal and equidistant, separated by more than a diameter; quadrangle of median eyes narrower in front, wider than high; clypeus equals diameter of a.m.e.; mandibles not much swollen at base, boss not well developed, reddish-brown, roughened, with a few long hairs, fang groove oblique, superior margin with three small teeth, a strong scopula from teeth to base of fang, inferior margin with five small teeth, the first and last very small, fang with a thick base; labium brown, tip rebordered, wider than long, lateral margins at basal third notched; maxillae brown, not twice as long as labium, apex not dilate, outer margins evenly rounded; sternum brown, nearly as wide as long, IV coxae separated by half a diameter; abdomen dark gray, almost covered by a scutum which extends on venter but ends do not meet, venter with a broad pale stripe from fold to spinnerets, with a square brown area in middle which may be a ventral scutum, sides dark brownish-gray; legs, I right missing, 4–1–2–3, I pair, femur red-brown, all other joints pale, spines, dorsal, basal, 1, median, 1, prolateral, 1, near tip, patella, 0, tibia, dorsal, 0, lateral, 0, ventral, 2–3, long and slender, not opposite, metatarsus, ventral, 2–2, lateral, 0, II pair, femur, dorsal, basal, 1, median, 1, prolateral, 2, patella, 0, tibia, ventral, 1–2, lateral, 0, metatarsus, ventral, 2–2; palpus not quite as long as cephalothorax, paler than cephalothorax, tibia one and a half times as long as patella, tibial apophysis rather small, lightly chitinized, seen from ventral side it appears as a semi-transparent leaf-like projection, and extends only slightly beyond tibia, bulb semi-spherical, extends beyond plane of palpus, tube within bulb with fewer coils than in *Corinna wheeleri* Petr., embolus from side of bulb near tip, extends across the cavity and ends in an abrupt turn near tip, below embolus and parallel with it, is a dark tooth-like piece which also rises from the bulb.

Female. Length, 5.6 mm., ceph. 2.6 mm., abd. 3.2 mm.

Cephalothorax and eyes same as in male; mandibles geniculate, larger than in male, a deep red-brown, roughened, with scattered long

black hairs, superior margin of fang groove with five teeth, the next to the last the largest; inferior margin with five graduated teeth, fang long and evenly curved; labium brown, wider than long, slightly excavate on basal third; maxillae brown, not twice as long as labium, outer margins rounded, tips not dilate; sternum pale brown, almost as wide as long, IV coxae separated by half a diameter; abdomen an even dark gray, the four muscle spots brown, no scutum, venter paler with no markings; legs 4–1–2–3, pale yellow with I femur darker, spines, I pair, tibia, ventral, 2–3, spines not opposite, rather slender and about the middle of the joint, lateral, 0, metatarsus, ventral, 2–2, lateral, 0, spines on II pair same as on I pair; epigynum very simple, with openings probably in the septum in a slight depression, on each side are large dark sacs beneath the skin.

Holotype ♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).

Allotype ♀ Cuba; Soledad, 4 August, 1931, (Worley).

Paratype ♀ Cuba; Soledad, August, 1934, (Darlington).

This species is smaller than the typical forms, and it differs from most by the few ventral spines on the anterior tibiae. Petrunkevitch described two species based on males from Puerto Rico. These are both larger than *Corinna parvula* and neither have a scutum on the dorsum. Simon described seven species from St. Vincent, all much larger. The coil in the bulb of the male palpus is probably specific.

Genus Trachelas L.C. Koch 1866

Trachelas bicolor Keyserling

Figures 224, 233, 235

Trachelas bicolor Keyserling, 1887, p. 440, pl. 6, fig. 15.

Male. Length, 4.6 mm., ceph. 2.4 mm., abd. 2.6 mm.

Cephalothorax deep red-brown, rugulose, head very high and swollen, sides rounded, thoracic groove deep; eyes, anterior row two-thirds width of head, straight, eyes subequal, a.m.e. separated by less than a diameter and from a.l.e. by almost a diameter and a half, posterior row covers almost entire width of head, strongly recurved, eyes subequal, p.m.e. separated by a diameter and a half and from p.l.e. by two diameters; quadrangle of median eyes narrower in front, as high as space between p.m.e.; clypeus less than radius of a.m.e.; mandibles red-brown, granulose, geniculate, boss poorly developed, outer margins about parallel, with a slight keel on basal fourth, inner

margins emarginate, with a strong keel ending in a blunt tooth midway, distal third more strongly excavate with a sharper keel ending in a blunt tooth, fang groove short, inferior margin with two teeth, fang with a heavy base; labium brown, longer than wide, lateral margins at basal third notched, sides converging; maxillae one and a half times as long as labium, concave on outer side, tips dilate; sternum red-brown, punctate, two-thirds as wide as long, margins carried between coxae, IV coxae separated by less than half a diameter; abdomen pale, covered with short hairs, venter pale; legs, 1–4–2–3, I pair slightly enlarged, little paler than cephalothorax, other pairs a pale yellow, no spines, I pair with a few cusps on tarsus, a double row on metatarsus and scattered cusps on tibia, II pair with two rows on metatarsus and a few on tibia, III metatarsus with a well defined ventral brush at tip, (preening comb of Petrunkevitch), IV metatarsus with a smaller brush; palpus pale, not as long as cephalothorax, from above tibia only slightly longer than patella, with no apophysis, cymbium slender, palpal organ very simple, basal half of bulb protruding from cavity, embolus a very short point from a truncate piece at tip, beneath on side, half hidden, is a long black spine.

Female. Length, 6.4 mm., ceph. 2.8 mm., abd. 4.0 mm.

The female is a little larger than the type. The epigynum is, as Keyserling figured, a pair of very black spots separated by less than a diameter posterior to a pair of depressions, anterior are two spear-shaped bodies beneath the skin, and these are much lighter colored, almost white. In the female from Santiago de las Vegas, the black spots are larger and almost touching, which is probably due to the convexity of the epigynum.

Holotype ♀ Haiti.

Allotype ♂ Cuba Santiago de las Vegas, (Horne and Houser), Banks Coll.

♂ Cuba; Trinidad Mountains, Buenos Aires, 2,500–3,500 feet, 9 May, 1936, (Darlington).

The species was described from a female which is in the Museum collection. The male is smaller than the type, and is closely related to *Trachelas lanceolatus* Cambridge from Mexico. In the latter, the outer margins of the mandibles are excavate, and the carina or keel on the outer margin is more curved, lacking the blunt tooth at the middle. Petrunkevitch, Trans Conn. Acad., 1931, **31**, p. 109, fig. 90, figures the epigynum of a specimen from Aibonito, Puerto Rico. This may be another species.

Sub-family MICARIINAE

Genus CHEMMIS Simon 1898

CHEMMIS BRUNERI Bryant

Chemmis bruneri Bryant, 1936, p. 331, pl. 23, fig. 9.

Known only from the type, a female from the Sierra de Cobre.

Genus MYRMECOTYPUS O.P. Cambridge 1894

MYRMECOTYPUS CUBANUS Banks

Myrmecotypus cubanus Banks, Trans. Ent. Soc. London, 1926, **74**, p. 433, fig. 1; Bryant, 1933, p. 190, pl. 4, figs. 43, 45.

Female. Length, 4.4 mm., ceph. 2.0 mm., abd. 2.4 mm.

Cephalothorax a bright brown with a darker mark in front of the middle, faint radial striae, margin of thoracic portion slightly emarginate, moderately convex, twice as long as wide, anterior margin rounded and twice the width of the posterior, thoracic groove wanting; eyes in parallel rows that cover three-quarters of the head, anterior row straight, equidistant, a.m.e. largest of the eight, separated by more than a radius, a.l.e. about half the diameter of a.m.e., posterior row very little longer than anterior, straight, eyes subequal, p.m.e. separated by fully two diameters and from p.l.e. by a diameter and a half, lateral eyes subequal and separated by fully two diameters; quadrangle of median eyes narrower in front and wider than high; clypeus higher than quadrangle and slightly convex; mandibles vertical, slightly swollen, boss poorly developed, fang groove oblique but short, superior margin with three black serrate bristles near base of fang, followed by a thick scopula, in this are two small teeth, inferior margin with two teeth opposite those on upper margin, fang with a thick base; labium brown, wider than long; maxillae more than twice as long as labium, outer margins parallel, tip truncate with a black margin; sternum brown, convex, five-sixths as wide as long, heart-shaped, IV coxae separated by half a diameter, I coxae brown, others white; abdomen almost black, with scattered white hairs, almost as broad as long, convex, basal scutum extends to middle but does not reach the venter, with a few white scales in addition to the white hairs, venter dark, basal scutum from pedicel to fold; legs, anterior pairs light brown with a pale dorsal stripe on all joints but tarsi, posterior pairs much

darker and stripe not as distinct, no spines on anterior pairs, posterior pairs with a long, median spine on femora, none on other joints; epigynum in ventral scutum, shows no structure but two widely separated depressions which are probably the openings, and equal their diameter from the fold.

Holotype ♂ Cuba; Soledad, 6 March, 1925, (Myers).

Allotype ♀ Texas; Brownsville, (Schaeffer).

♀ Cuba; Cienaga de Zapata, Central Covadonga, 16 September, 1936, (Davenport).

This species was described from a male and an immature female found with ants. Afterwards an adult female was found in a small collection from Brownsville, Texas. The female from Cuba has recently moulted and is a little longer than the allotype. It has no thoracic groove, the abdomen is not elongate, and because it has recently moulted, the white hairs and scales on the abdomen have not been rubbed.

The genus was erected by O.P. Cambridge in the Biol. Centr. Amer., 1894, 1, p. 123, for one species. In the revision, F.O.P. Cambridge added two more species known only from females. Simon in 1897, places the genus as a synonym of *Apochinomma* Pavesi. F.O.P. Cambridge shows that *Myrmecotypus* is a good genus. In the former, the posterior row of eyes is described as strongly recurved, the sternum attenuate and constricted between the III coxae, and the abdomen almost always depressed dorsally about the middle.

Genus Castianeira Keyserling 1879

Castianeira cubana spec. nov.

Figures 228, 232

Male. Length, 5.5 mm., ceph. 2.5 mm., abd. 3.0 mm.

Cephalothorax dark chestnut-brown, sparsely covered with white plumose hairs, twice as long as wide, anterior portion attenuate, thoracic groove short and distinct; eyes, anterior row slightly procurved, eyes subequal and equidistant, posterior row same length as anterior, procurved, eyes equidistant, p.m.e. largest of the eight, separated by more than a diameter, lateral eyes separated by a radius; clypeus equal to diameter of lateral eyes; mandibles dark brown,

vertical, inferior margin of fang groove with two teeth; labium wider than long, tip rebordered; abdomen cylindrical, dark brown, scutum covers entire abdomen; in life probably with transverse bands of white plumose scales, of which three near base and three less well marked at tip remain, venter brown with scutum from pedicel to fold and another from fold to near spinnerets, entire venter covered with short, stiff hairs; legs, femora dark brown with scattered white plumose hairs as on cephalothorax, anterior patellae, tibiae, metatarsi and tarsi almost white, posterior pairs with corresponding joints much darker, with scattered white plumose and short dark hairs, spines, I pair, patella, 1 very long trichobothria at tip, tibia, dorsal, 0, 1 very long trichobothria at tip, lateral, 0, ventral, 1–1 median, 1 prolateral above base, at tip a pair of long slender bristles, metatarsus, no dorsal or lateral, ventral, 2–2, median and basal, II pair, tibia, dorsal, 1 very long trichobothria at tip, lateral, 0, ventral, 1–1 median, 1 retrolateral above base, and at tip a pair of bristles slightly heavier than on I tibia; palpus about as long as cephalothorax, femur dark brown, other joints paler, tibia slightly longer than patella with a large ventral swelling the entire length, palpal organ of the usual type.

Female. Length, 7.3 mm., ceph. 3.3 mm., abd. 4.5 mm.

Cephalothorax, eyes and mouth parts same as in male; abdomen cylindrical, dark brown, scutum very small at base, most of white plumose scales have been rubbed off and only a few remain at base, a long median stripe from end of scutum to tip, widening posteriorly, covered with brilliant golden scales, venter with scutum to fold; legs same as in male but II tibia lacking all spines; epigynum of the usual type, posterior margin rounded and openings separated by about two diameters.

Holotype ♂ Cuba; Soledad, April, 1936, (Darlington).

Allotype ♀ Cuba; Soledad, April, 1936, (Darlington).

Paratype ♂ Cuba; Soledad, April, 1936, (Darlington).

This species is very near to *Castianeira amoena* (Koch) but is smaller and more slender. Both males of *C. cubana* are dark except for the anterior tibiae and metatarsi, while *C. amoena* has the legs entirely yellow. In the palpus the basal portion of *C. cubana* is not as globose as in the American species. The female is much smaller than *amoena*, and the posterior margin of the epigynum is convex rather than concave.

Family SALTICIDAE

Division I. Pleuridentati

Sub-family LYSSOMANINAE

Genus Lyssomanes Hentz 1844

Lyssomanes antillanus Peckham and Wheeler

Figures 230, 237

Lyssomanes antillanus Peckham and Wheeler, 1889, p. 226, pl. 11, fig. 1.

Male. Length, 4.5 mm., without mandibles, ceph. 1.7 mm., long, 1.8 mm., wide, abd. 2.5 mm., mand., 1.2 mm. long.

Cephalothorax yellowish-brown, with bright orange-red plumose hairs about eyes of first row, eye tubercles of second and third rows black, dorsal eye tubercle black, often with a broad darker median stripe including thoracic groove to posterior margin, thoracic groove long; eyes in four rows, first row covering entire width of head, eyes touching, second row slightly wider than first, eyes on tubercles directed slightly outward, third row nearer second than to fourth row, eyes very small, fourth row narrower, eyes subequal with second row and eye tubercles directed backward; eye area covers about two-fifths of carapace; clypeus very narrow, less than half a radius of a.m.e. and covered with red hairs; mandibles long and divergent, two-thirds as long as cephalothorax with two pairs of long bristles or spines interlacing on median margin near base, near apex are three or four graduated spines in an oblique row, superior margin of fang groove with one large tooth near origin of fang, dense scopula on median margin, inferior margin with three equidistant teeth and a very small tooth near base, the first tooth near base of fang largest, recurved and sometimes bifid, the third tooth is the smallest and sometimes is wanting, fang as long as groove and sinuous; labium long; maxillae long and dilate at tip; sternum almost round, IV coxae separated by a diameter; abdomen pale yellow with three pairs of widely separated black dots, venter pale; legs pale yellow with numerous very long spines, no fringe of long hairs on anterior tibiae and metatarsi, first metatarsus bent; palpus longer than cephalothorax, femur curved, tibia little longer than patella, without any special brush of hairs, four times longer than wide, apophysis at tip very small and pressed close to joint, palpal organ about half the length of terminal joint, embolus rather slender with tip bent at right angles towards the center, conductor more con-

spicuous than embolus, with a tooth on inner side, cymbium with a tooth near base above tibial apophysis.

Female. Length, 5.0 mm., ceph. 2.0 mm., abd. 3.0 mm.

Cephalothorax pale yellow with bright orange-red plumose hairs about the eyes of first row and a few below other eye rows, eye tubercles black, dark median stripe usually wanting; eyes same as in male; mandibles pale, very slightly inclined forward with the two pairs of interlaced spines as in the male, a slight swelling above origin of fang, teeth on fang groove smaller than in male, superior margin with three teeth, middle largest, scant scopula near base of fang, inferior margin with six graduated teeth; maxillae, labium and sternum same as in male; abdomen pale yellow with three pairs of faint gray spots widely separated as in the male, venter pale yellow; legs, 1–2–4–3, pale yellow with long spines and no fringe of long hairs; palpi, terminal joint not inlarged; epigynum, a pair of widely separated oval openings anterior to two round dark sacs that are beneath the skin and separated by about a diameter.

♂ ♀ Cuba; Soledad, garden, abundant during summer.

♂ Cuba; Havana, (Cervera).

♂ Cuba; Oriente, Baracoa, Macaguaniua River, 12 August, 1936, (Darlington).

This species was described from a male in the Simon Collection from San Domingo. Cambridge did not find it in Central America, and Petrunkevitch did not have it from Panama, the Virgin Islands, or Puerto Rico. In the collection of the Museum of Comparative Zoology are specimens from Haiti collected by Dr. Mann and identified by the Peckhams. It was found in great abundance by Banks and Worley during July and August at Soledad, and a few specimens were taken there by Salt and Myers during February and March.

The species shows great variation in size, color, and the number of teeth on the fang groove. Often the eye area is black and the color is continued as a broad black stripe to the spinnerets; when this is the case, the mandibles are dark brown and the median half is almost black, also the anterior legs have a faint black line on all joints; again, the oblique row of four or five spines near the tip of the mandibles becomes a mass of short spines, irregularly placed, as by Cambridge, in his figures of *Lyssomanes simplicipes*, *deinognathus* and *mandibulatus*. In this case, the third tooth on the inferior margin of the fang groove is wanting, but the structure of the male palpus is the same in all specimens. All the females I have seen, have been pale and the black is confined to the area around the eye tubercles and to the three pairs of black spots on the abdomen.

Sub-family MYRMARACHNINAE

Genus Synemosyna Hentz 1845

Synemosyna smithi Peckham

Figures 244, 246

Synemosyna smithi Peckham, 1893, p. 692, pl. 61, fig. 1; Banks, Trans. Ent. Soc. London, 1926, **74**, p. 427, pl. 93, figs. 5, 6.
Synemosyna formica, Banks, *nec* Hentz, 1909, p. 169.

Female. Length, 4.5 mm.m ceph. 1.7 mm., abd. 2.7 mm.

Cephalothorax shining chestnut-brown, a short black stripe each side includes the lateral eyes of the first row and the dorsal eyes, a few white hairs about first row of eyes, carapace constricted about midway between anterior and posterior margins, thoracic portion quite globose, then abruptly constricted before the pedicel; palpus white on upper side, dark beneath, terminal joints only slightly enlarged; eyes, eye area covers one-third of carapace, as long as wide, first row strongly recurved, eyes almost touching, a.l.e. about one-third diameter of a.m.e., small eyes nearer the first than third row, dorsal eyes directly behind a.l.e. and on extreme margin of the carapace, slightly larger than a.l.e.; mandibles brownish, small and vertical; maxillae and labium yellowish-white; sternum chestnut-brown, about twice as long as wide, truncate between first coxae and pointed in front of fourth coxae, fourth coxae almost touching, all coxae yellowish-white, fourth coxae and trochanters almost twice as long as anterior; abdomen blackish-brown with a chevron shaped white mark at constriction on dorsal side, venter pale to the constriction, a chitinous plate from pedicel to epigynum extends on sides but does not meet on the dorsum; legs, 4–3–1–2, anterior pairs cream-white, slender, fourth pair, femur almost entirely black with a white spot near base on ventral side, tibia, a broad dark stripe on dorsal side and a broad dark band at base on ventral side, other joints pale, third pair with similar markings but not quite as dark; epigynum a semicircular white area with no structure.

Male. Length, 4.2 mm., ceph. 1.5 mm., abd. 2.6 mm.

Coloring same as in female except that the anterior abdominal band is reduced to a pair of white spots and the white band at constriction does not meet, the abdominal constriction is much deeper, and in addition to the ventral chitinous plate there is a narrow chitinous plate from the epigastric fold beyond the constriction; mandibles much

larger than in the female, no teeth on inferior margin, fang groove slightly oblique, fang long; palpus, femur blackish-brown, patella and tibia cream-white with terminal joint brown, tibia not as long as patella, tibial apophysis as long as diameter of joint and at right angles to joint, tip truncate with one corner ending in a sharp point and the other in a round knob, palpal organ circular and protruding from the cavity, embolus coiled seven times about margin, ending in a very slender tip outside the cymbium.

♂ Cuba; San Antonio de los Baños, 1915, (Barbour and Brooks).
♂ Cuba; Trinidad Mountains, 21 March, 1925, (Salt).
♀ Cuba; Soledad, November, 1926, (Darlington).
♀ Cuba; Mina Carlota, December, 1927, (Creighton).
♂ ♀ Cuba; Soledad, August, 1931, (Banks).
♀ Cuba; Oriente, Boniato Range, Rio Frio, 5 June, 1936, (Darlington).

This species was described from a male and females from St. Vincent. A female co-type is in the collection of the Museum of Comparative Zoology. In the spring of 1925, while at Soledad, Drs. J. G. Myers and G. Salt found this species living with two species of ants. It was described and figured with other myrmecophiles in the Trans. Ent. Soc. London, 1926, **74**, p. 427–436, pl. 93. The color varies according to the host. Peckham undoubtedly had the paler form which lives with the ant, *Pseudomyrma flavidula* Sm., var. *pazosi* Smith, and the above description is of the darker variety found with *Pseudomyrma elongata* Mayr, var. *cubaensis* Forel. The species is very similar to *Synemosyna formica* Hentz found in eastern North America, but the West Indian species has rather more slender posterior legs, the male palpus differs in the tibial apophysis. The palpal organ is best shown in Emerton's figures in the Trans. Conn. Acad., 1891, **8**, pl. 21, fig. 5.

Sub-family THIODININAE

Genus Thiodina Simon 1901

Thiodina inerma spec. nov.

Figures 231, 239

Male. Length, 3.8 mm., ceph. 1.6 mm., abd. 2.2 mm.

Cephalothorax chestnut-brown, with eye area a deep yellow; on each side of the thoracic portion are three slender oblique lines of white hairs that start from the margin and disappear before reaching the

dorsal surface, one or two pairs of black lines radiate from the thoracic groove to posterior margin, no white line beneath second and third eye rows, many white hairs about second and third eye rows, cephalic portion high, limited posteriorly by a recurved depression, short thoracic groove in line with posterior margin of p.l.e.; eyes, anterior row recurved so that upper margins form a straight line, a.m.e. three times the diameter of a.l.e., each eye on a distinct collar with a fringe of orange-red hairs, a.l.e. on extreme margin of carapace, second row of eyes narrower than first, and separated from a.l.e. by a diameter and a half of the latter, much nearer to a.l.e. than to p.l.e., dorsal eyes on edge of carapace and a little larger than a.l.e.; quadrangle of lateral eyes twice as wide as long; clypeus about a radious of a.m.e., covered with white plumose hairs directed towards the middle; mandibles dark reddish-brown, vertical, flattened in front and transversely rugose, fang groove short; superior margin with a compound tooth and a row of setae from base of fang to tooth, inferior margin with one small tooth, fang evenly curved, with a very heavy base; labium about as long as wide; maxillae twice as long as labium with a widely dilate tip; sternum pale yellow, oval, longer than wide, (5 : 3), much narrowed between I coxae, widest between II coxae, ending in a point, IV coxae almost touching; abdomen three times as long as wide, dirty yellow with a pair of converging lines of small dark spots from base to spinnerets, sides with scattered elongate black dots, venter dark; legs, 1–4–2–3, I pair heaviest femur, patella and tibia chestnut-brown, ventral side of femur flattened and iridescent, without scales, retrolateral margin with a distinct carina the entire length, metatarsus and tarsus yellow, coxa long, trochanter one-half as long as coxa, patella two-thirds as long as tibia, metatarsus shorter than tibia, spines, femur, dorsal, 2 small spines near tip, patella, 0, tibia, ventral, 2–2, at distal quarter, both pairs less than a third of diameter of joint, 2–2, bulbous hairs near base in a mass of black hairs, the basal pair two-thirds length of joint, lateral, 0, dorsal, 0, II pair not quite as heavy as I pair, femur dark, other joints pale, spines, tibia, ventral, 2–2, not opposite on distal half, 1 median above the base, lateral, 0, dorsal, 0, III and IV pairs with very few spines, all patellae with no spines; palpus not as long as cephalothorax, dark, terminal joint paler, tibia shorter than patella, tibial apophysis forked, superior branch about as long as tibia, rather broad at base and narrowing gradually, inferior branch less than half as long, black, very slender and not sinuate, on ventral side of tibia is a large lobe, palpal organ very simple, embolus near tip, black, long, and sinuous.

Female. Length, 5.6 mm., ceph. 2.0 mm., abd. 3.6 mm.

Cephalothorax yellow, eye area white, eyes on black spots, thoracic portion with four pairs of radiating black lines which do not reach margin or thoracic groove; eyes as in male; mandibles pale yellow, vertical, superior margin of fang groove with a group of small teeth and a row of black setae, inferior margin with one large and one very small tooth opposite the group on the upper margin, median edge with row of black setae the entire length, fang short; maxillae with a dense brush of black hairs at tip; sternum pale yellow; abdomen, median area of cream-white spots bordered by black dots which form converging lines, sides with scattered black dots, venter mottled with white and scattered dark dots; legs, 1–4–2–3, yellowish-white, I pair slightly largest, spines, I femur, dorsal, 1–1 very short near tip, patella, 0, tibia, ventral, 1–1 prolateral on apical third, 1 retrolateral opposite the lower, 2–2 bulbous hairs near base, almost as long as joint, the black bulbous hairs are very conspicuous as the joint is pale, and there is no fringe of black hairs as in the male, the spines are very short and stout, dorsal, 0, lateral, 0, metatarsus, ventral, 2–2, very short, II pair, spines, tibia, ventral, 0, metatarsus, ventral, 2–2, III and IV pairs with very few spines; epigynum a pair of oval openings separated by less than half a diameter, anterior to a deeply bilobed darkened area, beneath the skin, fold is slightly concave.

Holotype ♂ Cuba; Soledad, garden, 15 August, 1931, (Worley).

Allotype ♀ Cuba; Soledad, Garden, 15 August, 1931, (Worley).

Paratypes ♂ ♀ Cuba; Soledad.

Paratype ♂ Cuba; Havana, (Cervera).

Paratype ♀ Cuba; (Parish), Peckham Coll.

Paratype ♂ Cuba; San Antonio de los Baños, (Pazos), 1915.

Paratype ♀ Cuba; Sierra de Cobre, 3,000–3,800 feet, 3–7 July, 1936, (Darlington).

Thiodina inerma can be separated from the two species of the genus found in the United States by the lack of spines on the posterior patellae, the spines on the second tibia, and in the male palpus, by the different proportion of the two branches of the tibial apophysis, also by the carina on the first femur. The unpaired spine on the second tibia is sometimes wanting and the other spines are not opposite. Simon based the genus on spines on the posterior patellae. In this species, the spines are wanting, but the general appearance is very like the two species found in the United States. The female has no spines on the second tibia.

Genus Nilakantha Peckham 1901

Nilakantha peckhami spec. nov.

Figure 238

Male. Length, 3.1 mm., ceph. 1.5 mm., abd. 1.6 mm.

Cephalothorax golden-brown, iridescent, on each side two narrow lines of white hairs from posterior margin directed towards the thoracic groove, a narrow line of white hairs starting below a.l.e. and parallel to second and third eye rows, cephalothorax broadest behind posterior eyes, posterior margin less than half anterior margin, cephalic portion flat, extends beyond thoracic groove, moderately high, thoracic groove short but distinct; eyes anterior row straight by upper margins, almost touching, a.m.e. three times diameter of a.l.e., p.m.e. very small, nearer a.l.e. than to p.l.e., (1 : 3); p.l.e. not on extreme margin of carapace, p.l.e. and a.l.e. subequal; quadrangle of lateral eyes narrower behind; clypeus concave, less than a radius on a.m.e.; mandibles dark brown, rather small, strongly divergent, fang groove long and oblique, margins poorly defined, no teeth on superior margin, inferior margin with one small tooth near base of fang and three small equidistant teeth near median edge, fang long and sinuous, distal half slender; labium dark brown, wider than long; maxillae twice as long as labium; sternum much narrowed between first pair of coxae, widest between second pair, three-fifths as wide as long, fourth coxae almost touching; abdomen almost twice as long as wide, wider at base, pale, with a pair of heavy dark basal spots that reach the middle, followed by three graduated cross bars on posterior half, spinnerets black, venter dark; legs, 1–2–4–3, I pair heaviest, femur dark, patella and tibia pale on dorsal side and dark on ventral, metatarsus, dark, tarsus pale, patella flattened on dorsal side, II pair marked the same as I pair, III and IV pairs much more slender and paler, spines, I pair, femur, dorsal, 3 short spines near tip, patella, 0, tibia, ventral, 2–2, short spines on distal half, 1 long bristle from a strong socket just above the base, metatarsus, 2–2, longer than diameter of joint, II pair, patella, 0, tibia, 2–2 distal half not opposite, no basal bristle, III pair, patella, 0, tibia, 2–1, IV pair, patella, 0, tibia, 2–2; palpus brown, not as long as cephalothorax, patella longer than wide, tibia half as long as patella, tibial apophysis bifid, upper branch pale, larger and tip pointed, lower branch about half as long as upper, dark, sinuous, ventral apophysis on the tibia directly below bulb is a short downward

curving spine, palpal organ very similar to others of this section with embolus sinuous and rather heavy.

Holotype ♂ Cuba; Soledad, May 1936, (Darlington).

The genus *Nilakantha* (genotype *cockerelli*) was based by Peckham on males and females found at Moneague, Jamaica. The description appeared in his paper "On Spiders of the Family Attidae found in Jamaica," Proc. Zoöl. Soc. London, 1901, pt. 1, p. 8, read, May 7, and published October 1. The genus was separated from *Plexippus puerperus* (Hentz) by the greater curvature of the anterior eye row and the relatively smaller a.l.e. On May 30, 1901, Simon published that part of the Hist. Nat. Araignées containing this genus, which he ascribes to Peckham as *Nilacantha* and the species as *cockwelli*. The Peckham spelling and definition of the genus must be used, as Simon did not cite a described species. Simon separates the genus from *Thiodina*, which he established the year previous, by the number of spines on the first tibia, 2–1, instead of 2–2, the absence of spines on the second tibia, and the three whorls of spines on the fourth tibia, characters not noted by Peckham in his original description.

Co-types of *Nilakantha cockerelli* Peckham are now before me, and have the first right leg and the left palpus missing; by modern illumination, several points not noted or wrongly noted in the original description, can be seen. The first tibia has two pairs of small spines on the distal half, two pairs of very long and slender bulbous hairs near the base; the second tibia has two pairs of spines, not opposite and no bulbous hairs; on the inferior margin of the fang groove is one tooth near the base of the fang and a group of two or three small teeth near the median edge. This will cause the description and key in the Hist. Nat. Araignées to be modified. The figures given by Peckham in the Pros. Zoöl. Soc. London, pl. 2, figs. 1–1g were probably done by J. H. Emerton. The flat cephalic portion which extends some distance behind the posterior eye row is shown, but the short thoracic groove is not figured.

Nilakantha peckhami is congeneric with *Nilakantha cockerelli*, but differs in the slightly smaller size, the widely divergent mandibles, no bulbous hairs on the first tibia, lack of whorls of spines on the fourth tibia, and the smaller ventral branch of the tibial apophysis. The genus *Nilakantha* undoubtedly will be retained, as both species have a district ventral spur or apophysis on the tibia of the palpus, a character not found in any species of *Thiodina*. The presence or absence of bulbous hairs on the first tibia and whorls of spines on the fourth tibia are evidently of specific rather than generic value.

Division II. Fissidentati

Sub-family PECKHAMIINAE

Genus Peckhamia Simon 1901.

Peckhamia americana (Peckham).

Synageles americana Peckham, 1892, p. 65, pl. 5, fig. 1.
Peckhamia americana, Peckham, 1909, p. 368, pl. 50, fig. 4, pl. 51, fig. 1.

This is one of the common ant-like spiders found in the southern states. In Florida, it is found with the ant, *Componotus planatus* Rogers, running in files up and down the trees. At Soledad, it is found in the dead banana leaves in the garden during April, May, June, and August. Franganillo reports it from Havana, and it probably will be found with the same ants all over Cuba.

Sub-family HASARIINAE

Genus Siloca Simon 1902.

Siloca cubana spec. nov.

Figures 242, 243

Male. Length, 3.0 mm., ceph. 1.5 mm., abd. 1.5 mm.

Cephalothorax dark brown, almost black about anterior eye row, eye area pale brown, a wide lateral stripe covered with short white hairs below p.l.e. to posterior margin, thoracic portion very high, anterior margin more than twice the width of posterior, thoracic groove short, starting from a line connecting posterior margins of p.l.e.; eyes, upper margins of eyes of anterior row form a slightly recurved line, eyes contiguous, a.m.e. more than twice the diameter of a.l.e., small eye about midway between a.l.e. and p.l.e., p.l.e. on extreme margin of carapace, a.l.e. and p.l.e. subequal; eye area covers more than two-fifths of carapace; quadrangle of lateral eyes slightly narrower behind than in front and twice as long as wide; clypeus below a.m.e. less than half a radius of a.m.e. and covered with short white hairs; mandibles dark brown, vertical, short, stout, fang groove about horizontal, superior margin with three teeth, the middle the largest, with a row of minute cusps, each bearing a long curved bristle, inferior margin with a bicuspid plate that covers more than half of the margin; labium dark brown, as long as wide; maxillae more than twice as long as labium, distal half pale, upper outer corner produced in a lobe so that width at the tip is equal to two-thirds the length; sternum dark brown,

triangular, as wide as long, widest between II coxae, IV coxae separated by about half a diameter; abdomen with a broad median pale yellow area, bordered by dark stripes that converge towards the center, forming two pairs of dots, one just below the middle and the other above the spinnerets, a narrow lateral pale stripe from base to first pair of dots, center pale with irregular dark dots; legs, 4–3–1–2, I pair heaviest, femur enlarged, yellow with a dark spot on upper side near tip, patella, tibia and metatarsus dark, tarsus pale, spines, I pair, patella, 1 prolateral, tibia, ventral, 2–2–2, lateral, 1–1, metatarsus, ventral, 2–2, lateral, 2–2, lateral spines are easily confused with the ventral, II pair not as much enlarged as I pair but coloring and spines are the same, III and IV pairs pale with indications of dark bands on patella and tibia, III tibia and III metatarsus of equal length; palpus rather short, about two-thirds as long as cephalothorax, tip of femur, patella and basal part of tibia covered with a dense mass of long white hairs, patella and tibia of equal length, tibial apophysis about two-thirds diameter of joint, tarsus longer than tibia, flattened at tip and scantily covered with long dark hairs, palpal organ very simple, embolus at tip forms two-thirds of a circle with tip ending outside on the cymbium.

Holotype ♂ Cuba; Soledad, March, 1925, (Salt and Myers).

Paratype ♂ Cuba; Soledad, July 1932, (Bates and Fairchild).

Paratype ♂ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Paratype ♂ Cuba; Coast below Pico Turquino, 30 June, 1936, (Darlington).

This species undoubtedly belongs near *Siloca monae* Petrunkevitch from Puerto Rico; but neither his species nor this, agree fully with Simon's description of the genus; Simon describes the palpus with a bulb that extends beyond the cymbium and rests on a lobe of the tibia. The genus was based on two species from Brazil, neither of which are represented in the Collection of the Museum in Comparative Zoology. It differs from the Cuban species of *Agobardus* in the short vertical mandibles and the bicuspid tooth on the inferior margin of the fang groove.

Siloca minuta spec. nov.

Figures 241, 245, 249

Male. Length, 2.3 mm., ceph. 1.3 mm., abd. 1.0 mm.

Cephalothorax black over eye area with posterior margin sharply defined by a curved line which includes the p.l.e. but does not extend to

thoracic groove, black area with scattered white hairs, thoracic portion yellowish, shaded with gray, lateral margins with a wide black line, cephalic portion very high, sloping abruptly a short distance behind p.l.e., thoracic groove very short; eyes, equidistant, anterior row recurved so that upper margins form a straight line, a.m.e. more than twice the diameter of a.l.e., small eyes midway between first and third rows, p.l.e. on extreme margin of carapace, slightly larger than a.l.e.; quadrangle of lateral eyes same width in front as behind; clypeus beneath a.m.e. less than a half a radius of a.m.e., dark with a very few white hairs; mandibles dark brown, vertical, short and stout, superior margin of fang groove with a scant fringe of stiff hairs and two small teeth near median edge, inferior margin with a large bicuspid tooth, fang short and stout; labium pale, wider than long; maxillae pale, very broad with rounded tips; sternum pale, oval, almost as wide as long, widest between II coxæ, IV coxae touching; abdomen pale yellow with a pair of widely separated lateral stripes which almost meet about middle and continue as converging irregular lines to the tip, sides with irregular gray lines, venter yellow with faint gray marks, the largest and most distinct being a round spot anterior to the spinnerets; spinnerets long; legs, 1–4–2–3, I pair slightly enlarged, all joints except tarsus dark gray, covered with dark hairs, femur flattened laterally, prolateral side iridescent black, tibia longer than metatarsus, spines, patella, 1 prolateral, tibia, ventral, 2–2–2, long and overlapping, prolateral, 2, metatarsus, 2–2, long and overlapping, prolateral, 2, II, III and IV pairs pale yellow, IV tibia shorter than metatarsus, tibia and metatarsus with dorsal spines; palpus shorter than cephalothorax, femur dark at base, distal half white and covered with white hairs, tibia shorter than patella, dark, tibial apophysis pressed close to terminal joint, triangular with a curved tip, palpal organ with embolus at tip forming almost a circle, bulb does not extend on tibia.

Female. Length, 3.0 mm., ceph. 1.6 mm., abd. 1.5 mm.

Cephalothorax, eye area black with a deep notch on posterior margin which does not extend to thoracic groove, very few white hairs, between the eyes is a scant fringe of long hairs above the anterior eyes, thoracic portion brown shaded with black near posterior margin, sides almost parallel, thoracic groove very short with anterior end on line drawn between posterior eyes, thoracic portion slopes abruptly to posterior margin a short distance from groove; eye area covers about one-third of carapace, upper margins of eyes of anterior row form a straight line, a.m.e. more than twice as large as a.l.e., small eyes about midway between first and third rows, dorsal eyes on margin of cara-

pace, slightly larger than a.l.e.; quadrangle of lateral eyes as wide in front as behind; clypeus almost wanting below a.m.e.; mandibles vertical, short and stout, superior margin of fang groove with two small pointed teeth, scopula composed of a few, long stiff hairs, inferior margin with a large bicuspid tooth nearly opposite the teeth of upper margin; labium wider than long, much narrower at tip than at base; maxillae slightly inclined towards labium, with rounded tip and almost parallel sides; sternum pale, oval, widest between II coxae, IV coxae almost touching; abdomen rather shrunken, very dark gray with a basal median pale stripe which widens and terminates before the middle, faint traces of cross lines on posterior half, entire abdomen covered with long coarse hairs, venter pale from pedicel to fold, thence heavily mottled with black to spinnerets; legs, 4–3–1–2, pale with a few dark hairs, I and II femora with a large black ventral spot that extends on prolateral surface, I pair very slightly enlarged, tibia longer than metatarsus, IV tibia shorter than metatarsus, spines, I pair, patella, prolateral, 1, tibia, ventral, 2–2–2, middle pair half as long as joint, prolateral, 1, metatarsus, ventral, 2–2, basal pair as long as joint, prolateral, 2, retrolateral, 2 posterior tibiae and metatarsi with paired dorsal spines, palpi pale, with terminal joint black; epigynum rather large, clear, with a pair of circular darkened areas near base, and anterior is a pair of dark spots which are probably the openings and lead to the darkened areas.

Holotype ♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).

Allotype ♀ Cuba; Soledad, 20 July, 1933, (Weber).

Paratypes ♂ ♀ Cuba; Soledad, 1–11 August, 1934, (Darlington).

Paratype ♀ Cuba; Soledad, May, 1936, (Darlington).

Paratype ♀ Cuba; Coast below Pico Turquino, 30 June, 1936, (Darlington).

Paratype ♂ Cuba; Sierra de Cobre, 3,000–3,800 feet, 3–7 July, 1936, (Darlington).

The generic position of this species is uncertain. The teeth on the fang groove are the same as in *Siloca monae* Petrunkevitch from Puerto Rico, but the number of lateral spines on the anterior tibiae and metatarsi do not agree with the definition of the genus or the Puerto Rican species. The epigynum is very similar to *Stoides pygmaea* (Peckham) from St. Vincent, which has a single tooth on the inferior margin of the fang groove but the cephalothorax is not as broad. The male differs from that of *Siloca cubana* by the smaller size, and in the palpus the tibia is shorter than the patella. The two species from Cuba and the Puerto Rican species have the palpal organ very similar. The white hairs on the male and female palpi are very conspicuous.

Genus Sidusa Peckham 1895.

Sidusa inconspicua spec. nov.

Figure 250

Female. Length, 4.5 mm., ceph. 2.0 mm., abd. 2.5 mm.

Cephalothorax, eye area black, with scattered white hairs, narrow median pale stripe from thoracic groove to posterior margin, sides on posterior half gray, recurved depression behind posterior eye row, thoracic groove short but distinct, cephalic portion high, thoracic portion falls abruptly from a point behind the p.l.e.; eyes, anterior row form a slightly recurved row by the upper margins, a.m.e. twice diameter of a.l.e., eyes almost touching, small eyes nearer p.l.e. than to a.l.e., p.l.e. not on extreme margin of carapace, larger than a.l.e.; quadrangle of lateral eyes narrower behind; clypeus below a.m.e. less than half a radius of a.m.e. with no hairs or scales; mandibles brown, vertical, with no hairs, fang groove horizontal and short, superior margin of fang groove with two teeth, inferior margin with one large tooth, a diagonal row of hairs on the inner surface of mandible, fang short and evenly curved; labium longer than wide, tip evenly rounded; maxillae about twice as long as labium and slightly inclined; sternum a broad oval, first coxae separated by a little more than width of labium, fourth coxae almost touching; palpi, femur pale, other joints brown, with a fringe of stiff black hairs on prolateral side of last joint; abdomen oval, dark gray, in life probably covered with short hairs as a few remain near the base, dorsum slightly rounded, a narrow pale median stripe to the first muscle spots, remainder of dorsum covered with small pale spots which on posterior half are arranged as chevrons, sides dark gray; legs, left I and II missing, 4–3–1–2, ventral sides of femora dark, interrupted dark rings at tip of patellae, base and middle of tibiae, III patella plus tibia not as long as IV patella plus tibia' spines, I pair, patella, 0, tibia, dorsal, 0, ventral, 2–2–2, lateral, 2, metatarsus, dorsal, 0, ventral, 2–2, lateral, 2, II pair, patella, 0, tibia, dorsal, 0, ventral, 2–1–1, lateral, 2, metatarsus, ventral, 2–2, lateral, 2, III pair, patella, 1–1, tibia, scattered, metatarsus, apical whorl, IV pair, patella, lateral, 1–1, tibia, dorsal, 1 at base, metatarsus, apical whorl; epigynum, directly above the fold are two large dark sacs beneath the skin, separated by less than half a diameter, anterior to these are two small pale areas, a pair of dark dots between the pale and dark areas are probably the openings.

Holotype ♀ Cuba; Trinidad Mountains, Buenos Aires, 2,500–3,500 feet, 9 May, 1936, (Darlington).

Franganillo has given a very brief description of his *Menemerus fasciculatus* as having an abdomen thickly covered with minute clear spots. Probably the spots are hair pits as is the case with all the described species, but since *Menemerus* has a very low and flat cephalothorax, while *Sidusa inconspicua* is high and rounded, it is hardly probable that the two are the same species. *S. inconspicua* is separated from *S. turquinensis* by the epigynum and by the presence of a dorsal spine at the base of the IV tibia.

Sidusa turquinensis spec. nov.

Figures 240, 248

Male. Length, 4.4 mm., ceph. 2.1 mm., abd. 2.3 mm.

Cephalothorax very dark brown, with scattered white hairs and scales, most numerous about thoracic depression, a few yellow hairs about anterior row of eyes, cephalic portion high, recurved depression posterior to dorsal eyes, thoracic groove short, starting from the depression, thoracic portion slopes gradually from the depression half way to posterior margin, then slopes abruptly, sides only slightly rounded on thoracic portion; eyes, anterior row recurved, so that upper margin of a.m.e. and lower margin of a.l.e. form a straight line, equidistant, a.m.e. almost twice the diameter of a.l.e., a fringe of orange hairs above eyes, small eyes midway between first and third rows, dorsal eyes not on extreme margin, subequal with a.l.e.; quadrangle of lateral eyes as wide behind as in front; clypeus below a.m.e. hardly more than a line, with no hairs or scales; mandibles dark brown, vertical, flat, fang groove slightly oblique, superior margin with two sharp teeth at median edge, inferior margin with one large sharp tooth nearer base of fang than tooth on the upper margin, fang quite long; labium dark brown, tip rebordered and pale, as long as wide; maxillae pale brown, more than twice as long as labium, slightly inclined, tips widened but upper corner scarcely prolonged in a lobe; sternum very dark brown, slightly iridescent, more than two-thirds as wide as long, widest between II coxae and pointed in front of IV coxae, IV coxae touching; abdomen dark brown, with a pale spear-mark on basal half, followed by a pair of dark spots and a transverse bar above spinnerets; sides with pale longitudinal lines, in life probably covered with iridescent scales as a few remain on the sides, venter almost black with lateral pale stripes

meeting in front of spinnerets, each side of spinnerets a distinct black spot; legs, 4–1–2–3, I pair pale brown except for tarsus, femur slightly enlarged, flattened laterally, patella and tibia with a ventral brush of black hair, spines, patella, prolateral, 1, tibia, dorsal, 0, ventral, 2–2–2, prolateral, 2, all less than diameter of joint, metatarsus, ventral, 2–2, basal pair more than half the length of the joint, lateral, 0, II pair, femur pale, other joints darker, brush of dark hair beneath patella and tibia not as heavy as on I pair, spines same as on I pair, III and IV femora pale, other joints darker, spines, patellae, 1–1, III metatarsus distal whorl, IV metatarsus, distal and median whorls, IV tibia, no dorsal spine at base; palpus about as long as cephalothorax, femur, patella and tibia white and covered with long white hairs, seen from above, tibia more than two-thirds as long as patella, tibial apophysis about as long as diameter of joint, with a very slender curving black tip, terminal joint longer than tibia plus patella, palpal organ extending in a large lobe on ventral side of tibia, embolus at tip curves in a semicircle and ends slightly outside cavity, prolateral margin of cymbium with a fringe of coarse black hair.

Female. Length, 5.5 mm., ceph. 2.1 mm., abd. 3.1 mm.

Cephalothorax and eyes same as in male; mandibles vertical with a sharp tooth on inferior margin as in male; maxillae not prolonged on upper outer corner as in male; sternum pale but the same shape as in male; abdomen pale brown with a pale median stripe about one-third the width of abdomen extending beyond the middle, and ending in a truncate bar followed by a dark chevron, each side of pale stripe about middle is a dark spot, these two dark spots and the dark chevron can be traced in the male, venter pale with a pair of widely separated lateral stripes that do not reach the spinnerets or the fold, spots each side of spinnerets larger than in the male; legs, 4–1–2–3, pale, posterior pairs with indistinct dark rings on tibiae and metatarsi, I pair heaviest, femur slightly enlarged, spines, patella, prolateral, 1, tibia, ventral, 2–2–2, lateral, 0, metatarsus, ventral, 2–2, basal pair more than half the length of joint, distal pair more than diameter of joint, lateral, 0, II pair tibia, ventral, 2–2–1, lateral, 0, III and IV patellae, lateral, 1–1, IV metatarsus with distal and median whorls, IV tibia with no dorsal spine at base; epigynum, a pair of circular depressions almost touching on median line, posterior to the depressions are two pairs of dark sacs, the lower pair almost touching, a pair of dark spots at lower end of anterior pair probably indicate the openings.

Holotype ♂ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Allotype ♀ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Paratype ♀ Cuba; Pico Turquino, 6,000 feet, June, 1936, (Darlington).

Paratype ♂ Cuba; Soledad, May 1936, (Darlington).

Paratype ♀ Cuba; Mountains North of Imias, 3,000–4,000 feet, 25–28 June, 1936, (Darlington).

This species has been placed in the genus *Sidusa* as it is defined by F.O.P. Cambridge in the Biol. Centr. Amer., 1901, **2**, p. 196. It is also close to those American species of *Habrocestum*, which Peckham (1909) states do not agree with the European species of the same genus. It is evidently related to *Saitis* (?) *inutilis* Peckham, (1901) from Jamaica, but differs in the tibial apophysis of the palpus and in the spines on the posterior legs. Cambridge places in the genus *Sidusa*, all species with the embolus of the palpus confined to the distal fourth, and he does not distinguish between a sharp conical tooth or broad cusp on the inferior margin of the mandibles. From the number of specimens seen, the presence or absence of the dorsal spine at the base of the IV tibia is constant in this species. The male paratype from Soledad is much smaller than the holotype from Pico Turquino, and the first pair of legs lack the ventral brush of dark hair on the patella and tibia, but the palpus and the arrangement of spines is the same.

Sub-family MAEVIINAE

Genus Metacyrba F.O.P. Cambridge 1901

Metacyrba taeniola (Hentz)

Attus taeniola Hentz, 1846, p. 353, pl. 21, fig. 5.
Metacyrba taeniola, Peckham, 1909, p. 486, pl. 39, fig. 5, pl. 40, fig. 4.

This species is fully described and figured by Peckham. It is found from New York to Wisconsin and south to Mexico. As Peckham points out, the number of spines on the first tibia is very variable. In the Cuban specimens only one small spine is found.

♀ Cuba; Jiguani, Los Negros, February 1913, (Barbour), Peckham identification.

3 ♂ Cuba; Soledad, quarry 30 July, 4 August, 1931, (Worley).

Genus Balmaceda Peckham 1894

Balmaceda peckhami spec. nov.

Figures 247, 251

Female. Length, 4.2 mm., ceph. 1.9 mm., abd. 2.5 mm.

Cephalothorax moderately high, chestnut brown, black about eyes, white scales in a thick mass between eyes and on sides, no thoracic groove or depression behind dorsal eyes, and widest behind them, thoracic portion continuing on same level as cephalic until near the posterior margin when it slopes abruptly, sides rounded; eyes, anterior row straight by upper margins, equidistant, a.m.e. separated by less than half a radius, more than twice the diameter of a.l.e., small eyes nearer a.l.e. than to p.l.e., a pair of rod-like bristles below each a.l.e., dorsal eyes not on margin of carapace and subequal with a.l.e.; quadrangle of lateral eyes as wide in front as behind and covering more than a third of the carapace; clypeus retreating and almost wanting below a.m.e.; mandibles vertical, dark brown, superior margin of fang groove with two small teeth, and a row of setae between teeth and the base of fang, inferior margin with a large bicuspid tooth, fang short and evenly curved; labium dark brown, twice as long as wide; maxillae dark brown, almost twice as long as labium, tips rounded and slightly dilated; sternum dark, oval, narrowed between I coxae to width of labium, twice as long as wide, widest between II coxae, rounded posteriorly, IV coxae contiguous; palpi cream-white with conspicuous black spots at tips of femur, patella and tibia, terminal joint not enlarged; abdomen with a wide median dark stripe indented at muscle spots, in life evidently covered with white scales as a few remain on sides, sides with diagonal white and dark lines, venter dark; legs, 4–3–1–2, I pair enlarged, dark chestnut-brown with scattered white scales on femur, patella and tibia, I coxae largest, dark, trochanter about one-third length of coxa, femur flattened laterally, with a few clavate bristles beneath, tibia enlarged, metatarsus and tarsus pale, spines, femur, dorsal, 3 long heavy spines in series, patella, 1 small prolateral spine, tibia, ventral, 2–2–2, basal pair not opposite, those on prolateral side, longer but not equal to diameter of joint, first spine about one-third distant from base, lateral, O, dorsal, O, metatarsus, ventral, 2–2, basal pair long, lateral, O; II, III and IV pairs pale yellow, femora with long dorsal spines, no spines on patellae, very few on tibiae and metatarsi, IV tibia longer than IV metatarsus, IV tibia with 1 basal spine and 1–1 at tip as in female *Hentzia;* epigynum

very simple, anterior to the epigastric fold is a pair of circular depressions, separated by less than one-half a diameter.

Holotype ♀ Cuba; Soledad, February 1925, (Salt and Myers).

The generic position of this species is uncertain. *Balmaceda picta*, the genotype, now in the collection of the Museum of Comparative Zoology, has three pairs of heavy spines beneath the first tibia base slightly raised prolateral spines and there are rod-like bristles beneath the a.l.e. Peckham does not mention them in his description nor are they figured in the drawing of the entire spider; also both male and female have a short thoracic groove in a depression. In the Histoire Naturelle des Araignées, **2**, p. 846, fig. 999, Simon figures the cephalothorax of *Balmaceda variegata* Simon from Pará, with the rod-like bristles beneath the a.l.e., usually associated with the female *Hentzia*, and in the description of the genus, he uses this as a generic character, but it is very probable that he knew the genotype only from figures and the description.

Balmaceda peckhami can not be placed in the genus *Rudra* found in Central America and Brazil, for in that genus the cephalothorax is low and flat, the sides are almost parallel, and the eyes cover only about a fifth of the cephalothorax, the tibial spines are very heavy and are from a raised base. Because of the teeth on the fang groove, the arrangement of spines on the first tibia, and of the few spines on the III and IV pairs of legs, it might be placed near *Hentzia*, but because of the enlarged first tibia and the very different type of epigynum, it must be put in another section. It is evidently closely related to *Balmaceda variegata* Simon. However, it is thought best to place it in that genus until the West Indian Salticidae are better known since so many genera have been described from one sex.

Sub-family ZYGOBALLINAE

Genus Agobardus Keyserling 1884

Agobardus Keyserling, 1884, p. 519.
Commoris Simon, Ann. Soc. Ent. Belgique, 1902, **46**, p. 382.
Emathis Petrunkevitch, 1930, p. 118, *nec* Simon.

The genus *Agobardus* was based by Keyserling from on specimens sent him from the Museum of Comparative Zoology with the locality label "U.S." There was but a single species, *Agobardus anormalis*. Afterwards he sent two females to Peckham. These were described in his "Attidae of North America" 1909, and at the end of the descrip-

tion, Peckham states that Banks is probably correct in his assumption that they come from the West Indies. Within a few years the species has been found in Haiti by Darlington and Bates, so it is not improbable that the original specimens were collected by Uhler in Haiti many years ago and the labels were lost or mixed. The greater part of the collection made by Uhler in Haiti was sent to Keyserling and described by him in the Verhandlung. The types were returned and are now in the Museum of Comparative Zoology.

In 1902, Simon based the genus *Commoris* on a species from Guadaloupe. Later, Peckham identified the same species from Dominica and it was figured by Mr. Emerton; a short description was published by Dr. Petrunkevitch in "Attidae of the Yale Dominica Expedition", Journ. N. Y. Ent. Soc., 1918, **22**, p. 329, pl. 12, figs. 1–3. *Commoris* was placed by Simon in the section *Hasariceae*, a section that has a high cephalic portion, mandibles vertical and parallel. The fang groove is rather short, the superior margin with two teeth, the inferior margin with one tooth, divided in two equal points in the male but unequal in the female; the maxillae are rather long and broadly rounded on the outer side.

Petrunkevitch, in his "Spiders of Porto Rico," places very similar spiders in *Emathis*, which belongs in the section next to *Hasariceae*. The character used to separate the two sections is the broad denticulate plate on the inferior margin of the fang groove which is divided in several denticles or teeth. The number often varies on the right and left margins and is consequently an unsatisfactory character. The genus *Emathis* is East Indian, and in a specimen of the genotype, *Emathis weyersi* in the Museum of Comparative Zoölogy Collection, the mandibles are vertical and rather small, fang short, the first leg not enlarged and with no modifications; the palpus is short and the tibia not as long as the diameter of the joint, but the palpal organ is relatively large, all characters not found in West Indian species. It is therefore evident that the West Indian species referred to that genus have been wrongly placed.

In the Histoire Naturelle, 1903, **2**, p. 780, fig. 935, the mandibles figured as *Commoris enoplognatha* are probably of some other species because a large spur is shown on the median margin quite near the base, and no tooth or carina is shown on the outer margin. In the original description there is no mention of a spur.

So long a time has elapsed since the genus was described by Keyserling that it is thought well to give a new description:—

Cephalic portion very high, lateral margins rounded, crescent-shaped

depression posterior to dorsal eyes, thoracic portion falls abruptly from midway between groove and posterior margin, thoracic groove very short, starting from the depression; anterior row of eyes strongly recurved, small eyes midway between first and third rows, dorsal eyes not on extreme edge of carapace; mandibles large and divergent in some males, and vertical in females and small males, fang groove long with a large more or less divided tooth on the inferior margin, fang long and sinuous; maxillae in male often prolonged in a lobe on upper outer side; first leg longest, and in male, femur often enlarged and modified by a spur or a carina on ventral side; basal spines on first metatarsus very long, fourth metatarsus with distal whorl; palpus as long as, or longer than cephalothorax, the palpal organ not resting on the tibia.

The genus is confusing as there are often two forms of males, the larger with porrect mandibles, and the first pair of legs usually heavier. In the smaller form, the mandibles are small as in the female, but there are the same modifications as found in the larger forms. Five of the six species from Cuba have the palpus longer than the cephalothorax.

Franganillo has described two species of *Emathis* from Cuba. One, *Emathis cubensis*, has been identified, but the second is stated to have a single spine on the first tarsus and has not been seen by me. Possibly it does not belong to the genus *Agobardus*.

In three of the six species of *Agobardus* from Cuba, the males have a distinct chitinous lobe over the opening of the spiracle. Keyserling did not find it in the genotype, *Agobardus anormalis*. The first notice of this lobe is by O.P. Cambridge in his description of the genus *Menalippe* in the Biol. Centr. Amer., 1898, **1**, p. 284, a genus since placed as a synonym of *Chemmis* by later workers. Dr. Chickering has noted the same lobe in five species of Clubionidae from Panama, described by a him in 1937. So far it has been found only in the males.

Key for *Agobardus* males

1 Mandibles with long sharp tooth on median margin 2
Mandibles without a tooth on median margin 4

2 Mandibles with a short cusp on outer margin opposite the long tooth . . . . . *keyserlingi* spec. nov.
Mandibles without a cusp on outer side 3

3 Distal two-thirds of fang groove deeply excavate . . *cubensis* (Frang.)
Basal third of fang groove excavate . . . . . *mandibulata* spec. nov.

4 Cephalothorax with swelling below lateral eyes, mandibles with pronounced carina from base to fang ending in a tooth..... ..... *prominens* spec. nov.
Cephalothorax with no swelling below lateral eyes.....5

5 Mandibles divergent with a fringe on outer margin..... ..... *fimbriata* spec. nov.
Mandibles vertical with no fringe on outer margin..... ..... *mundus* spec. nov.

Agobardus cubensis (Franganillo)

Figures 252, 253, 256

Emathis cubensis Franganillo, 1934, no. 107, fig. 28; id., 1936, p. 129, fig. 72.

Male. Length, 5.5 mm., ceph. 2.6 mm., abd. 3.0 mm.

Cephalothorax a very dark brown, a patch of white hairs below p.l.e., a smaller white patch midway between thoracic groove and posterior margin, and a wide lateral stripe of white hairs on thorax, head high, sides evenly rounded, anterior row of eyes carried forward, crescent-shaped depression posterior to dorsal eyes from which the thoracic groove starts, thoracic portion slopes gradually from groove to about midway of margin and then falls abruptly; eyes, anterior row recurved, a.l.e. little more than radius of a.m.e., small eyes about midway between first and third rows, dorsal eyes not on extreme margin of carapace and subequal to a.l.e.; quadrangle of lateral eyes slightly wider in front; clypeus less than half a radius of a.m.e. and without hairs or scales; mandibles dark brown, slightly divergent, with a distinct carina on both margins, area between iridescent, inner margins parallel for basal third, thence abruptly diverge; at point of divergence is a tooth directed forward; on the superior margin of the fang groove are two small teeth, on the inferior margin is a broad cusp opposite the two teeth on the upper margin, divided in four or five denticles, fang long and sinuous; labium as long as wide; maxillae brown, twice as long as labium, upper margin a round lobe; sternum pale yellow, oval, two thirds as long as wide; IV coxae almost touching; abdomen pale yellow with a pair of faintly marked stripes on basal half, a pair of dark spots posterior to the middle, and a smaller pair above the spinnerets, sides with dark lines, venter with a large black spot from fold almost to spinnerets, a lobe over the opening of spiracle; legs, 4–3–1–2, anterior coxae with a pronounced basal lobe, I pair enlarged,

all joints but tarsus dark brown, coxae twice as long as wide, trochanter less than one-third as long as coxa and very much narrowed, a retrolateral fringe of short black hairs on distal half of femur, patella and tibia, ventral side of femur flattened with a slight carina each side and area between an iridescent violet, ventral distal half of patella and entire length of tibia with a brush of short black hairs, spines, tibia, ventral, 2–2–2, lateral, 2, all spines short and basal pair very small, metatarus, ventral, 2–2, basal pair very long, lateral, 2, II pair not enlarged and no ventral fringe of hairs, spines same as on I pair, III and IV pairs pale yellow, with a large dark spot on ventral side of femora near tip, broken dark rings at base and middle of tibiae, all patellae with paired lateral spines, IV metatarsus with apical whorl only, IV tibia longer than III tibia; palpus not as long as cephalothorax, femur curved, tip with a dense mass of white hairs forming a crest on dorsal side, as long as tibia plus patella, tibia slightly longer than patella, tibial apophysis as long as diameter of joint, tarsus a little longer than tibia, palpal organ very simple, bulb not extending on tibia, embolus at tip and curved.

Female. Length, 6.5 mm., ceph. 2.5 mm., abd. 3.8 mm.

Cephalothorax very dark about eyes, a median pale area extends forward between the posterior eyes, lateral stripes of white hairs; eyes as in male; mandibles vertical, pale brown, superior margin of fang groove with three teeth and a scant scopula to base of fang, inferior margin with a large plate divided in four or five teeth, fang short with a heavy base; labium same as in male; maxillae brown, inclined, with outer margins rounded; sternum pale; abdomen dull yellow with a pair of dark stripes broken in spots, dark streaks on sides, venter pale; legs, pale, I and II pairs slightly enlarged, a scant fringe of rather colorless short hairs on under side of I femur, patella and tibia as in the male but with no brush, spines same as in male, basal pair on metatarsus almost as long as the joint; epigynum, two large oval depressions separated by a quarter diameter and the same distances from the epigastric fold, with a darkened circular area in anterior portion.

Franganillo described this species from a female and an immature male from Santiago. It is probably common all over Cuba, as it has been found abundantly in the garden at Soledad, on the south side of Pico Turquino, Trinidad Mountains, and San Vicente in Pinar del Rio. In the Peckham Collection, there are three females from Holguin collected by Parish, and marked by Peckham as a new species.

There are two forms of males, the larger described above, having the large divergent mandibles, with the anterior side flat and a carina on

each margin, fang groove deeply excavate, and fang long and sinuous; this form has the first pair of legs enlarged, the ventral side of the femur flattened, often with a retrolateral fringe of short hairs beneath patella and tibia; the smaller form has the vertical mandibles as in the female, but the anterior side is flat with a carina on each margin, fang groove excavate, and the arrangement of teeth is the same as in the larger form, the first leg is not as large, but the ventral side is flattened while the retrolateral fringe and the brush on the patella and tibia is not as heavy.

Agobardus fimbriatus spec. nov.

Male. Length, 3.7 mm., ceph. 2.0 mm., abd. 1.5 mm.

Cephalothorax very dark with a pale stripe from the short thoracic groove to posterior margin, white hairs between the eyes of the anterior row and a narrow marginal stripe of white hairs on posterior half and a patch of white hairs posterior to thoracic groove, a slight lateral swelling below the lateral eyes which is margined by a crest of short black hairs; eyes, anterior row of eyes covers the entire width of head, a.l.e. about half the diameter of a.m.e., small eyes about midway between first and third rows, dorsal eyes not on extreme margin of carapace and subequal with a.l.e.; quadrangle of lateral eyes as wide behind as in front; clypeus equal to one-half radius of a.m.e., slightly retreating and covered with white scales; mandibles dark, large and strongly divergent, a fringe of dark curving hairs on outer margin to base of fang, superior margin of fang groove with a compound tooth at median edge and a few cusps each bearing a hair, grading into corrugations near the fang, inferior margin with a large tooth or plate covering more than a third of the margin, the end nearest the base of the fang prolonged in a long sharp point, fang long and sinuous; labium brown, about as long as wide; maxillae pale, more than twice as long as labium, outer corner produced in a slight lobe; sternum oval, two-thirds as wide as long, IV coxae almost touching; abdomen with a median pale stripe bordered by broad dark stripes broken at the middle, posterior half with vague chevrons, venter dark, with no lobe over spiracle; legs, 4–3–1–2, I pair pale with short dark hairs on all joints, coxa enlarged, femur flattened laterally, with no modifications, spines, patella, lateral, 1–1, tibia, ventral, 2–2–2, basal pair very short, lateral, 2, metatarsus, 2–2, basal pair very long, lateral, 2, II pair slightly enlarged and clouded with dark hairs, spines same as on I pair, III and IV pairs pale, tibiae slightly darker, all patellae with

1–1 lateral spines; palpus as long as cephalothorax, femur curved, as long as tibia plus patella, tibia and patella of equal length, tibial apophysis dark, not quite as long as diameter of joint, tarsus twice as long as tibia, covered with long coarse black hairs, palpal organ very simple as in others of the genus.

Holotype ♂ Cuba; Soledad, woods, 3 August, 1931, (Worley).

Paratype 2 ♂ Cuba; Soledad, 3 August, 1931, (Worley).

Paratype ♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).

In this species there are males with two forms of mandibles, the type with the large divergent mandibles, and the smaller form with vertical mandibles. The smaller form is darker, the anterior legs are all dark, but the palpus is the same in both and the mandibles have the fringe of short dark hairs. The species is very close to *Agobardus prominens* but it lacks the swelling below the lateral eyes and the mandibles have a fringe of short hairs instead of a carina.

Agobardus keyserlingi spec. nov.

Figures 254, 255, 257, 259

Male. Length, 4.8 mm., ceph. 2.6 mm., abd. 2.5 mm., mand. 2.8 mm.

Cephalothorax reddish-brown, black about the eyes, below the lateral eyes orange-red hairs, a small spot of white scales on thoracic slope, white scales on lateral margins of posterior half, cephalic portion high, no lateral swellings below lateral eyes, eye area flat, crescent-shaped depression between posterior eyes from which starts the short thoracic groove, sides rounded, sloping, thoracic portion darker, sloping abruptly from midway between groove and posterior margin; eyes, anterior row very strongly recurved, almost touching, a.l.e. little more than half the diameter of a.m.e., small eyes midway between first and third rows, p.l.e. and a.l.e. subequal; quadrangle of lateral eyes as wide behind as in front; almost no clypeus below a.m.e.; mandibles porrect, slightly divergent, a long sharp tooth on median margin very near the base, with tips touching, near outer margin at same distance from base, a cusp bearing a stout incurving tooth, dorsal surface slightly rounded and shining, with a distinct ridge on outer margin, seen from the ventral side, the large tooth is not on margin of fang groove, on superior margin is a compound tooth at end of a carina, on the inferior margin slightly nearer the base of the fang is a compound tooth with the largest point directed towards the fang, each margin has a distict carina, an excavate area from teeth to

base, fang long and slightly sinuous with apical third slightly constricted; labium dark brown, longer than wide, lateral margins emarginate at base; maxillae brown, almost twice as long as labium, with upper outer corner produced in a distinct pointed lobe; sternum brown, anteriorly little wider than labium, three-quarters as wide as long, rather pointed between IV coxae, which are separated by almost half a diameter, I coxae largest, trochanters three-quarters as long as coxae; abdomen pale, covered with long and short hairs, lateral dark stripes almost meeting at middle and gradually disappearing, four faint cross bars on posterior half that could almost be called chevrons, venter with a broad pale gray stripe from pedicel to near spinnerets, a reddish lobe covering the openings of the spiracle; legs differing little in length, 1–4–3–2, I pair heaviest, coxae and trochanters very long and can be seen from the dorsal side, femur pale on dorsal side, ventral basal portion dark, femur slightly enlarged, flattened laterally, on ventral side just above the base is a prominent point or cusp, spines, patella, lateral, 1–1, tibia, dorsal, 0, ventral, 2–2–1, prolateral, 2, median and basal, retrolateral, 2, metatarsus, ventral, 2–2, lateral, 2–2, II pair pale, femur with a prolateral dark spot, but not modified, tibia with a prolateral stripe, spines same as on I pair, III and IV pairs pale, spines, patella, lateral, 1–1, III metatarsus, median and apical whorls, IV metatarsus, basal, median and apical whorls; palpus longer than cephalothorax and very slender, pale brown, femur curved, dark with a few white scales at tip, tibia longer than patella or cymbium, with a few orange-red scales on dorsal side, tibial apophysis a dark spur, not as long as diameter of joint, no ventral lobe on tibia, cymbium about two-thirds as long as tibia, a heavy brush of coarse black hairs on prolateral margin, a few orange-red scales on dorsal side, palpal organ of the usual type with the embolus at tip, starting from a thick base and after an abrupt turn, ends as a slender tube outside the cavity, palpal organ does not extend as a lobe on tibia.

Female. Length, 4.0 mm., ceph. 2.0 mm. abd. 2.1 mm.

Cephalothorax pale yellow with lateral eyes on a broad dark stripe, a few white hairs between eyes of anterior row, cephalic portion high, no swelling below lateral eyes, eye area flat, thoracic portion sloping abruptly from a point midway between thoracic groove and posterior margin; eyes same as in male; mandibles pale brown, vertical, slightly geniculate, fang groove short, horizontal, two teeth on superior margin; opposite on inferior margin a short plate divided in three points, fang with a thick base, evenly curved; maxillae pale, almost twice as long as labium, upper outer corner evenly rounded, upper margins black and

transverse; sternum pale, four-fifths as wide as long, anteriorly the width of labium, pointed between IV coxae, IV coxae separated by a diameter; abdomen oval, pale, with dark lateral stripes interrupted before the middle, posterior half with dark chevrons, sides with longitudinal dark stripes, venter pale with a very faint gray broad stripe as in the male; legs, pale, 1–4–2–3, I pair not modified, spines same as in the male; epigynum an oval pale depression, wider than long, with two oval dark sacs almost filling the area, openings apparently near anterior margin, separated by more than a diameter.

Holotype ♂ Cuba; Oriente, Boniato Range, Rio Frio, 5 June, 1936, (Darlington).

Allotype ♀ Cuba; Sierra de Cobre, Loma del Gato, 2,600–3,325 feet, (Bruner).

Paratype ♂ Cuba; Oriente, Boniato Range, Rio Frio, 5 June, 1936, (Darlington).

Paratype ♂ ♀ Cuba; Sierra de Cobre, Loma del Gato, 2,600–3,325 feet, (Bruner).

Paratype ♂ ♀ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June 1936, (Darlington).

Paratype ♂ ♀ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Paratype ♂ Cuba; Coast below Pico Turquino, 30 June, 1936, (Darlington).

There are two forms of males; the larger described above has the large divergent mandibles, with the tooth on the inferior margin of the fang groove in the form of a plate ending in a sharp point directed towards the base of the fang; the first pair of legs longest and heaviest, with the large pointed cusp near the base of the femur. The smaller form with vertical mandibles, has the plate on the inferior margin of the fang groove divided in three teeth. In this form, the palpus is shorter but still longer than the cephalothorax, and the tibia is shorter. The palpal organ is the same in each. *Agobardus keyserlingi* is the only species with cusps on the outer lateral margins of the mandibles that has been seen from Cuba. *Emathis minuta* Petrunkevitch from Puerto Rico, which probably belongs in this genus, has a similar cusp but nearer the base of the fang, and an undescribed species from Jamaica also has this cusp. The females found with the males, are smaller, paler, and neither legs nor mandibles are modified. The epigynum is similar to *Agobardus prominens* but the depressed area is much wider in proportion, and both openings and tubes are separated, entering the sacs on the outer margins.

AGOBARDUS MANDIBULATUS spec. nov.

Figures 262, 263, 268, 269

Male. Length, 4.0 mm., ceph. 2.2 mm., abd. 2.8 mm.

Cephalothorax golden-brown, black about the eyes, posterior margin black, a few orange and white hairs between anterior eyes, cephalic portion high, with a recurved depression between posterior row of eyes from which starts the short thoracic groove, thoracic portion slopes abruptly midway between the groove and the posterior margin, a patch of white hairs midway between thoracic groove and margin; eyes, anterior row recurved by upper margins, a.l.e. less than half the diameter of a.m.e., small eyes midway between first and third rows, dorsal eyes not on extreme edge of carapace and subequal with a.l.e.; quadrangle of lateral eyes slightly narrower behind and two-thirds as wide as long; clypeus less than a radius of a.m.e., without hairs or scales; mandibles, elongate, porrect and only slightly divergent, anterior surface flattened, corrugate, little more than half as wide at tip as at base, longer than diameter of mandible at base, fang groove strongly oblique, superior margin with a bifid tooth, two-thirds distance from base of fang, inferior margin with a plate or cusp divide into four unequal denticles, slightly nearer base of fang than tooth on upper margin, both margins with a distinct carina, basal portion excavate, fang longer than basal joint and sinuous, distal third plainly constricted; labium longer than wide; maxillae very broad, rounded on inner margin, upper edge convex and upper outer corner prolonged in a sharp point so that greatest width is equal to length; sternum brown, widest between I coxae and ending in a rounded point in front of IV coxae; abdomen pale, with a pair of dark stripes from near base, interrupted near the middle and ending about one-third above spinnerets, median area on posterior half with a few oblique dark marks not meeting in middle, venter light gray, with a lobe over opening of spiracle; legs, 1–4–3–2, I pair slightly longer than IV pair, enlarged, femur dark brown, other joints lighter, coxa largest with a basal lobe, trochanter two-thirds as long as coxa, rather slender, femur with a large ventral conical tubercle very near base, fringe of short black hairs from base to tubercle and a scant fringe of white hairs on apical half, spines, patella, lateral, 1–1, tibia, ventral, 2–2–2, lateral, 2, metatarsus, ventral, 2–2, lateral, 2–2, II pair slightly enlarged, femur not as dark as I pair, with a very scant fringe of hairs and no spur, coxa with basal lobe, other joints pale, III and IV coxae and tro-

chanters brown, other joints pale yellow, all patellae with 1–1 lateral spines; palpus longer than cephalothorax, very slender, femur curved, tibia one and a half times length of patella and almost twice as long as tarsus, tibia and patella white with a few dark hairs, tibial apophysis not as long as diameter of joint, tarsus covered with dark hairs, palpal organ very simple, embolus at tip forms a semicircle and ends outside the cymbium.

Female. Length, 4.6 mm., ceph. 2.1 mm., abd. 2.2 mm.

Cephalothorax a very pale brown, black about eyes and a narrow median pale stripe from posterior margin which disappears in eye area, sides vertical, eye area flat, crescent-shaped depression between posterior row of eyes from which starts the short thoracic groove; eyes same as in male; mandibles pale, vertical, fang groove transverse, superior margin with two teeth, inferior margin with a plate divided in four subequal denticles, fang with a thick base; labium pale, longer than wide, tip narrowed and lateral margins at base excavate; maxillae pale, almost twice as long as labium, inclined so that tips almost touch, upper margins with a dense black scopula, upper outer corner rounded but not prolonged in a lobe as in the male; sternum pale, narrower than in male, IV coxae separated by more than half a diameter; abdomen pale, with a pair of dark lateral stripes from near base, broken about middle and ending one-third above spinnerets, in median pale area of posterior half, four pairs of diagonal dark bars not meeting in middle, sides pale, venter pale with a faint dark U mark, no lobe over opening of spiracle as in male; legs, 3–4–1–2, pale, with dark spines, I pair not enlarged, spines, patella, lateral, 1–1, tibia, dorsal, O, ventral, 2–2–2, basal, median and apical, lateral, 1–1, metatarsus, dorsal, O, ventral, 2–2, lateral, 2–2 IV metatarsus with apical whorl; epigynum, a pair of circular depressions, faintly marked, separated by half a diameter, below are darkened areas with a pair of very dark circular spots just posterior to the pale areas; the openings are probably faint depressions half over the dark spots.

Holotype ♂ Cuba; Trinidad Mountains, Buenos Aires, 2,500–3,500 feet, 9 May, 1936, (Darlington).

Allotype ♀ Cuba; Trinidad Mountains, Buenos Aires, 2,500–3,500 Feet, 9 May, 1936 (Darlington).

Paratypes 5 ♂ 1 ♀ Cuba; Trinidad Mountains, 9 May, 1936.

Paratype ♂ Cuba; Trinidad Mountains, Mina Carlota, 19 March, 1925, (Salt and Myers).

Paratype ♂ Cuba; Soledad, May 1936, (Darlington).

Paratype ♂ Cuba; Soledad, 28 November, 1926, (Darlington).

Paratype ♂ Cuba; Soledad, San José, summit, 1 August, 1931, (Worley).

Agobardus mandibulatus is very close to *Agobardus keyserlingi*, known only from the eastern end of Cuba. In both, the males have a large median tooth on the mandibles, but *A. mandibulatus* lacks the tooth from a cusp on the outer lateral margin of the mandibles. Both have the first femur in the male produced in a ventral sharp angle or cusp near the base. The palpus of *A. mandibulatus* has the tibial apophysis hardly as long as the diameter of the joint and the tibia about twice as long as the tarsus; the tube in the palpal organ has a more simple curve. In both species, there is great variation in the length of the median tooth on the mandible and in the size of the cusp at the base of the first femur.

Keyserling, in his description of the genus, states that the labium is not longer than broad, a character that probably is not constant.

Agobardus mundus spec. nov.

Figures 258, 260, 264

Male. Length, 4.0 mm., ceph. 2.4 mm., abd. 2.5 mm.

Cephalothorax chestnut-brown, with a pale stripe from posterior margin to, and including thoracic groove, no spot of white hairs on posterior slope, many long bristles above anterior eye row, cephalic portion very high and carried forward, eye area flat, sides parallel and vertical, crescent-shaped depression between posterior eye row from which starts the short thoracic groove, thoracic portion rather short, sloping abruptly from groove to margin; eyes, anterior row recurved by upper margins, eyes equidistant, a.l.e. more than half the diameter of a.m.e., small eyes midway between first and third rows, p.l.e. and a.l.e. subequal; quadrangle of lateral eyes as wide behind as in front; clypeus below a.m.e. less than a radius of a.m.e. with no hairs or scales; mandibles dark brown, vertical, no carina on front lateral margins, fang groove oblique, superior margin with one long tooth at inner margin followed by a much smaller tooth, small denticles from base of fang to tooth each bearing a long bristle, inferior margin with a very large plate or cusp, nearer base of fang than tooth on upper margin, corner nearer base of fang in a long sharp point, fang a simple curve with a faint tooth on lower side about middle, labium brown, longer than wide, lateral margins at base emarginate; maxillae brown, twice as long as labium, inclined, tips rounded, and upper outer corner

not prolonged in a lobe; sternum as wide as long, widest between II coxae, ending in a rounded lobe in front of IV coxae, IV coxae almost touching; abdomen oval, pale with a pair of wide parallel dark stripes which end just beyond the middle, on posterior half are three pairs of irregular spots, sides dark, venter with a dark brown triangle which does not reach the spinnerets, opening of spiracle not covered with a lobe; legs, 1–4–2–3, I pair not modified, pale brown, femur not enlarged, spines, patella, 1 prolateral, tibia, dorsal, 0, ventral, 2–2–2, lateral, 2, metatarsus, ventral, 2–2, basal pair more than half the length of joint, lateral, 2, II pair pale, spines same as on first pair, III and IV pairs pale, spines, patella, 1–1, metatarsus with apical whorl only; palpus not quite as long as cephalothorax, dark, femur bent, apical half on dorsal side covered with long white hairs which form a crest, tibia very little longer than patella, tibial apophysis slightly divergent, stout with an incurving tip, about as long as diameter of joint, bulb not carried on tibia, embolus at tip, quite short, curved in a plane at right angles to bulb, tip straight and nearly reaching margin of cavity.

Female. Length, 4.0 mm., ceph. 1.8 mm., abd. 1.8 mm.

Cephalothorax with dark lateral stripes from posterior eye row to posterior margin, median area pale but darker in eye area, thoracic groove very short, starting from the crescent-shaped depression between dorsal eyes, posterior lateral margins pale; eyes same as in male; no clypeus below a.m.e.; mandibles pale brown, vertical, fang groove horizontal and rather short, superior margin with two small teeth and a row of small granules each bearing a bristle, inferior margin with a broad plate, which has the corner farthest from the fang produced as a tooth; labium pale brown, longer than wide; maxillae almost twice as long as labium, tips and upper outer corner rounded; sternum pale, same as in male; abdomen pale with parallel dark stripes deeply indented on outer side about the middle and connected by a bent transverse bar just above the spinnerets, no lobe over spiracle; legs, 1–4–2–3, pale, with broken dark rings at base and at middle of tibiae, spines as in male; epigynum, a pair of circular depressions, almost touching, with very faintly chitinized margins, posterior are two large deeply colored round sacs which touch on median line, between depressed areas, and dark sacs are transverse tubes.

Holotype ♂ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Allotype ♀ Cuba; South side of Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Paratypes ♂ 5♀ Cuba; South side Pico Turquino, 3,000–5,000 feet, June, 1936, (Darlington).

Paratype ♂ Cuba; Pico Turquino, 5,000 feet, June, 1936, (Darlington).

According to the classification given by Simon in the Hist. Nat. Araignées, this species should be placed in *Commoris* in the *Hasarieae*, as the plate on the inferior margin of the mandibles is divided in two unequal teeth in the male and the upper outer corner of the maxillae is rounded, not prolonged in a lobe. However, it differs from the other species of *Agobardus* only in these two characters and it has the same pattern on the abdomen, a very high cephalic portion and the same type of epigynum. It differs from *Commoris enoplognatha* by the small vertical mandibles that have no carina on the outer margin.

Agobardus prominens spec. nov.

Figures 261, 266, 267, 271

Male. Length, 4.5 mm., ceph. 2.2 mm., abd. 2.1 mm.

Cephalothorax dark brown, almost black about the eyes, golden and white hairs between the eyes, with a broad pale stripe from thoracic groove to posterior margin, cephalic portion high, a swelling or ridge starting from lateral margin and forming a broad lobe below the lateral eyes, black hairs on posterior margin of ridge directed forward, and scattered white scales on anterior portion, thoracic groove short, starting from the crescent-shaped depression between dorsal eyes; eyes, anterior row strongly recurved, a.l.e. about half a diameter of a.m.e., small eyes midway between first and third rows, p.l.e. and a.l.e. subequal; quadrangle of lateral eyes as wide behind as in front; clypeus less than a radius of a.m.e., thickly covered with short white hairs and a fringe of white hairs on the margin; mandibles dark, strongly divergent with a sharply marked carina on exterior side from base to origin of fang, ending in a tooth above the fang, portion inside the carina concave and slightly corrugate, inner margin excavate, fang groove strongly oblique, superior margin with a large compound tooth, inferior margin with a plate or tooth divided in cusps almost opposite tooth on upper margin, cusp nearer fang very long, fang longer than groove and sinuate, distal third constricted; labium as long as wide; maxillae with almost parallel sides, upper outer corner prolonged in a small lobe; sternum brown, four-fifths as wide as long, widest between I coxae, IV coxae almost touching; abdomen grayish-yellow with

vaguely defined lateral dark stripes, sides shaded with dark gray, venter black from pedicle to spinnerets, no lobe over spiracle; legs, 1–4–3–2, I pair largest, coxa, femur dark, distal half much inlarged, no ventral fringe of hairs, other joints yellow, with dark hairs on ventral side of patella, tibia and metatarsus, spines, femur, dorsal, 2, patella, lateral, 1–1, tibia, ventral, 2–2–2, lateral, 2, metatarsus, ventral, 2–2, lateral, 2, II pair, dark and slightly enlarged, fringe of dark hairs beneath on tibia, spines same as on I pair, all patellae have 1–1 lateral spines; palpus as long as cephalothorax, very slender, femur curved, dark brown with a mass of white hairs on distal third, patella and tibia of equal length, patella flattened on dorsal side, tibia very dark, tibial apophysis not as long as diameter of joint and not pressed close to tarsus, tarsus little longer than tibia and almost black, palpal organ very simple as in others of the genus, emoblus at tip forms two-thirds of a circle.

Female. Length, 4.0 mm., ceph. 1.6 mm., abd. 2.5 mm.

Cephalothorax very dark about eyes, median pale stripe very distinct, no lateral swellings below lateral eyes as in male; eyes same as in male; mandibles vertical, without carina on outer side, superior margin of fang groove with six minute cusps between base of fang, and a large plate which is divided in several cusps, inferior margin with plate that is divided in two sharp cusps, fang short; abdomen with a median pale stripe with dark lateral stripes broken at the middle, posterior half darker, venter pale with dark spots, the largest directly in front of the spinnerets; legs, 1–4–2–3, short and stout, pale yellow, I pair, femur enlarged, spines, tibia, ventral, 2–2–2, lateral, 3, metatarsus, ventral, 2–2, basal pair almost as long as joint, lateral, 2, all patellae with 1–1, lateral spines; epigynum, two oval clear areas close together with round dark sacs at the base almost touching on median margin, tips of sacs slightly pointed and darker, openings close together at anterior margin of clear areas, connected by colorless tubes which apparently enter sacs at base, these tubes are almost parallel the first half and gradually diverge.

Holotype ♂ Cuba; Soledad, garden, 14 August, 1931, (Worley).

Allotype ♀ Cuba; Soledad, BelMonte, 10 August, 1931, (Worley).

Paratype ♂ Cuba; Soledad, garden, 14 August, 1931, (Worley).

Paratype ♂ Cuba; Soledad, March 1925, (Salt and Myers).

A smaller form of the male has been found with vertical mandibles as in the female, but the exterior surface has the distinct carina as in the larger male, the fang groove has the same teeth as in the larger form, and there is no difference in the palpus. This species has the

same lateral swelling below the lateral eyes as in the genotype, but it also has a distinct carina on the outer side of the mandibles that ends in a tooth above the fang as is found in *Commoris enoplognatha* Simon. The first leg is not modified.

Genus Zygoballus Peckham 1885

Zygoballus concolor spec. nov.

Figures 265, 272, 273

Male. Length, ceph. 1.6 mm. without mandibles, abd. crushed.

Cephalothorax brown, cephalic portion covered with small iridescent scales, two darkened areas between posterior eyes, clypeus thickly covered with white scales which extend on lateral margins as far as p.l.e., cephalic portion very high and flat, occupying three-fifths of carapace, sides vertical, no thoracic groove but a wide shallow depression between p.l.e., carapace widest at p.l.e.; eyes, anterior row recurved so that upper margins form a straight line, a.l.e. less than half a diameter of a.m.e., small eyes one-third nearer first than third row, very small and inside a line drawn between a.e.l. and p.l.e., dorsal eyes on extreme margin of arapace, directed outward, subequal with a.l.e.; quadrangle of lateral eyes wider behind than in front, three-quarters as wide as long; clypeus concave, fully half the diameter of a.m.e. and thickly covered with white scales; mandibles vertical, slightly divergent, median margin deeply excavate, front surface covered with white scales, usual carina from base to origin of fang slight, and tooth above fang small, fang groove long and oblique; superior margin with one long sharp tooth near the inner margin that can be seen from the outside, inferior margin with a plate that extends from inner margin two-thirds the length of groove, ending in a "hammer-headed tooth," fang long, slender and evenly curved; labium brown, broader at base than long, sides excavate at base, tip less than half the width at base; maxillae brown, nearly twice as long as labium; sternum only slightly longer than wide, anteriorly little wider than labium, ending in a truncate tip in front of IV coxae, IV coxae almost touching; abdomen crushed so that it is impossible to distinguish markings; legs, 1–4–2–3, I pair much the longest, coxa elongate, trochanter two-thirds as long as coxa, femur dark, slightly enlarged, flattened laterally, other joints pale yellow, spines, patella, 0, tibia, ventral, 2–2–2, first pair one-third distance above base, prolateral row heavier and slightly curved, lateral, 0, metatarsus, ventral, 2–2, II pair pale yellow, spines,

patella, 0, tibia, ventral, 1–3, metatarsus, ventral, 2–2, III pair, pale yellow, spines, 0, IV pair, femur distal half dark, remainder of leg pale, spines, tibia, ventral, 2 apical, metatarsus, 1 basal whorl; palpus as long as cephalothorax, femur dark, other joints pale, seen from above, tibia two-thirds as long as patella, tibial apophysis very broad at base with a short, curved black tip, terminal joint as long as patella, on inner side near tip is a row of stiff black hairs, embolus a short stout black point near tip.

Female. Length, 4.0 mm., ceph. 1.5 mm., abd. 2.5 mm.

Cephalothorax deep reddish-brown, black about the eyes, sides thickly covered with white scales and a few long hairs directed forward, two darkened areas posterior to first row of eyes as in the male, a long curved bristle below p.l.e., cephalic portion high and level, slopes abruptly from dorsal eyes to posterior margin, no thoracic groove, eye area covers three-fifths of carapace, anterior row of eyes form a straight line by upper margins, a.m.e. more than twice the diameter of a.l.e., small eyes one-third nearer first than third row, dorsal eyes on extreme margin of carapace and larger than a.l.e.; quadrangle of lateral eyes wider behind than in front; clypeus almost wanting below a.m.e., below a.l.e. covered with white scales; mandibles vertical, brown, covered with white scales, slightly rounded, superior margin of fang groove with two teeth, inferior margin with one sharp tooth, fang evenly curved; labium nearly twice as long as wide, more than half as long as maxillae; maxillae much broader at tip than at base, tip rounded; sternum pale, oval, but little longer than wide, widest between II coxae, IV coxae almost touching; abdominal markings very indistinct, showing a narrow median dark branched stripe on a deep yellow ground, sides dark, venter brown; legs, 4–1–2–3, I pair only slightly enlarged, femur reddish-brown with white scales, other joints paler, coxa largest and trochanter half the length of coxa, spines, femur, dorsal, 1 minute spine near tip, patella, 0, tibia, ventral, 2–2–2, basal pair one-third length of joint from base, lateral, 0, metatarsus, ventral, 2–2, lateral, 0, II pair much smaller than I pair, coxa and trochanter normal, spines, femur, dorsal, 1 small spine near tip, patella, 0, tibia, ventral, 1–1–1, lateral, 0, III and IV pairs, femur dark, with darker rings at base of patella, tibia and metatarsi, no spines; epigynum, two oval openings almost touching, with posterior margins heavily chitinized, just anterior to the emarginate posterior margin, twisted tubes can be seen beneath the skin.

Holotype ♂ Cuba; Soledad, 1–11 August, 1936, (Darlington).

Allotype ♀ Cuba; Havana, (Cervera).

This species is closely related to *Zygoballus suavis* Peckham from Jamaica but differs in the male in the following points; tooth on upper side of mandibles smaller, plate on inferior margin of fang groove with two sharp points at tip, ("hammer-headed" of Cambridge) instead of one point; a heavy band of white scales on clypeus extending on sides to p.l.e., and the in palpus, by the patella longer than tibia instead of equal length.

Peckham fails to mention the epigynum, in the description, and the pair in the collection in the Museum of Comparative Zoology has been dried, so that it is impossible to distinguish details. All the species from Central America are figured with the openings widely separated. There is always the posssibility that the pair are of different species as they were not collected together, but so far as is known the fauna of Havana and Soledad is similar, and this is the only species of the genus reported from the island.

Division III. Unidentati

Sub-family PLEXIPPINAE

Genus Corythalia C.L. Koch 1850

Corythalia arcuata Franganillo

Figures 275, 276

Corythalia arcuata Franganillo, 1930, p. 43, fig. 16; ibid., 1936, p. 137, fig. 76.

Male. Length, 5.3 mm., ceph. 3.0 mm., abd. 2.6 mm.

Cephalothorax dark brown, lateral stripes of white hairs and white scales about the eyes, cephalic portion high and inclined forward, sides vertical and parallel, a crescent-shaped depression behind dorsal eyes from which starts the short thoracic groove, area anterior to depression sharply defined with black, eye area flat, thoracic portion slopes gently from the groove halfway to posterior margin, then falls abruptly; eyes anterior row recurved, equidistant, a.m.e. twice the diameter of a.l.e., small eyes midway between first and third rows, a.l.e. and p.l.e. subequal, p.l.e. raised and directed slightly backward, several long bristles between eyes of anterior row and a group of four long bristles below lateral eyes; quadrangle of lateral eyes as wide behind as in front; clypeus below a.m.e. less than half a radius of a.m.e., scantily covered with orange scales, several long hairs on margin of clypeus; mandibles dark with scattered white scales, rather small, vertical, front surface flat, fang groove short, no teeth on superior margin, one very small tooth on inferior margin, fang short with a very thick base;

labium as long as wide; maxillae inclined and almost meeting over labium; sternum dark with scattered white iridescent scales, two-thirds as long as broad, I coxae separated by a diameter, truncate in front of IV coxae; abdomen oval, specimens that have not been rubbed show four spots of thick black hairs, basal pair not well defined, second pair smaller, on posterior half of abdomen the space between spots thickly covered with white iridescent scales and scattered long hairs; in some lights the scales appear tawny or even a bright red, venter dull gray, spinnerets long; legs, 3–4–1–2, anterior pairs heavier, prolateral sides with scattered iridescent scales, all trochanters with scales, I pair, femur flattened laterally, with a scant fringe of black hairs beneath patella and tibia, spines, patella, 0, tibia, dorsal, 0, ventral, 2 apical, followed by 1–1 prolateral, 1–1, all spines heavy but not as long as diameter of joint, metatarsus, ventral, 2–2, lateral, 2–2, so as to form a whorl, II pair, dark brown, with a scant fringe of black hairs on ventral side of tibia and metatarsus, and a scanter fringe or crest of short black hairs on dorsal side of tibia and metatarsus, spines same as on I pair, III pair, dark brown, patella, tibia and metatarsus with a ventral fringe, not brush, of long black hairs, and a crest of shorter hairs on dorsal side of metatarsus, also a sharp carina on both prolateral and retrolateral side of metatarsus; area between slightly corrugate and iridescent, the crest is on the retrolateral carina, spines, patella, retrolateral, 1; impossible to see spines on tibia and metatarsus because of the heavy fringe of hairs, IV pair, paler than other legs, with no fringe or crest of hairs, patella and tibia shorter than patella and tibia of III pair but metatarsus IV longer than metatarsus III, spines, patella, lateral, 1–1, tibia, scattering, metatarsus, apical and median whorls; palpus dark, not as long as cephalothorax, tip of femur and patella covered with white iridescent scales, seen from above tibia shorter than patella, tibial apophysis broad, abruptly narrowing to a short, incurving hook, cymbium covered with coarse black hairs, bulb extending in a lobe on tibia and partly covered with long, coarse bristles, upper portion of bulb, a lobe which half hides the short and straight embolus.

Female. Length, 6.0 mm., ceph. 3.1 mm., abd. 3.1 mm.

Markings and eyes same as in male; legs lack the fringe and modifications of the III metatarsus, anterior patellae with prolateral spine, posterior patellae with prolateral and retrolateral spines; epigynum, a broad median lobe abruptly ending in a point, the openings are probably each side at the anterior end and are widely separated, beneath can be seen large dark sacs.

The type was found in the Sierra Maestra by Franganillo. From the number collected at Soledad, it must be very abundant. It has been taken on the summit of Pico Turquino and at various places in the Oriente. In the Peckham Collection, there is a pair from Holguin collected by Parish. Undoubtedly it is near *Corythalia peckhami* Petrunkevitch from Dominica, for both species have the heavy fringe of black hairs beneath the patellae, and tibiae of the second and third legs but the palpus and epigynum are quite distinct. There is great variation in size, and in the abdominal markings of both of male and female. In some specimens, there are two pairs of black spots, one basal but not well defined, and the second pair of spots on the posterior half of the abdomen sharply outlined by a distinct line of white scales; on other specimens the basal spots are missing and there is a median stripe of tawny scales that is very conspicuous. Again, the amount of fringe of dark hairs on the anterior legs varies, but the third leg always has a heavy fringe of dark hairs, and the dorsal side of the III metatarsus has a carina on both retrolateral and prolateral sides with an iridescent area between. The tibial apophysis of the palpus is always the same, a broad base with an incurving hook at the tip.

Corythalia aurata (Hentz)

Attus auratus Hentz, 1846, p. 362, pl. 22, fig. 6.
Prostheclina cambridgei Peckham, 1889, p. 69, pl. 1, fig. 51, pl. 5, fig. 51.
Stoidis aurata, Peckham, 1909, p. 527, pl. 38, fig. 7, pl. 43, fig. 9.

This brilliant little spider is common in collections from the southern part of the United States. Both males and females are in the Peckham Collection from Holguin made by Parish, and females have been taken at Soledad and Pinar del Rio. The marks on the abdomen are very similar to *Corythalia arcuata* Franganillo which accounts for the confusion of the two species.

Simon based the genus *Stoides* on *Prostheelina pygmaea* Peckham from St. Vincent, and separated it from *Corythalia* as the cephalothorax is higher and shorter, the thoracic portion is plainly narrowed and abruptly sloping, anterior row of eyes almost straight, small eyes nearer third than first row, legs without fringe, slender, with fewer spines, anterior metatarsi with no retrolateral spines and III and IV pairs subequal, simple hairs and no scales.

In 1909, Peckham added *aurata* Hentz to the genus *Stoides* and noted the differences from the genotype. The cephalothorax of *aurata*

is high but the clypeus and sides are vertical, not inclined, anterior row of eyes is curved, not straight, and the small eyes are midway between first and third rows; the anterior metatarsi have retrolateral spines, I and II pairs are slightly fringed, cephalothorax, abdomen and legs have iridescent scales but III and IV pairs are subequal. It seems to have more characters in common with *Corythalia* than with *Stoides* but eventually a new genus will be made for it. It is evidently related to many of the small species from the West Indies, placed by Peckham and Banks in the genus *Prostheclina.*

Corythalia emertoni spec. nov.

Figures 270, 274, 279

Male. Length, 3.2 mm., ceph. 2.0 mm., abd. 1.5 mm.

Cephalothorax very dark brown, stripes of white scales above the margin, cephalic portion high and carried forward, sides parallel and vertical, crescent-shaped depression behind posterior eyes from which starts the short thoracic groove; thoracic portion slopes gently from the depression halfway to posterior margin and then falls abruptly; eyes, anterior row recurved by upper margins, eyes almost touching, a.m.e. more than twice the diameter of a.l.e., small eyes about midway between first and third rows, p.l.e. very convex and subequal with a.l.e.; quadrangle of lateral eyes slightly wider behind than in front; clypeus about diameter of a.m.e., scantily covered with white scales; mandibles dark brown, vertical, fang groove very short, no tooth on either margin, fang with a thick base; labium as long as wide; maxillae once and a half as long as labium, inclined over labium, upper outer corner prolonged in a slight lobe; sternum brown, four-fifths as wide as long, I coxae separated by more than a diameter and a half, ending in an obtuse point before IV coxae, IV coxae almost touching; abdomen with hairs and scales about rubbed off, a few white scales on sides and a few long black hairs left on basal pair of dark spots, both widely separated, and between posterior pair are indistinct chevrons, venter pale; legs, II right missing, 3–4–1–2, anterior pairs heavier, I pair, femur flattened laterally, dark, other joints paler, spines, patella, 1 prolateral, tibia, dorsal, 0, ventral, 2 apical, 1–1, retrolateral, prolateral, 2, metatarsus, ventral, 2–2, lateral, 2–2, II pair, brown, heavy fringe of black hairs on patella, tibia and metatarsus, spines, patella, prolateral, 1, tibia, spines can not be seen because of fringe, metatarsus, ventral, 2–2, lateral, 2–2, III pair, femur, dark beneath, other joints

paler, heavy brush of hairs on prolateral side of tibia and metatarsus, spines, patella, lateral, 2, tibia, 2 apical, 2 lateral, metatarsus, apical and median whorls, IV pair, pale, spines, patella, 2 lateral, tibia, scattering, metatarsus, apical and median whorls, IV metatarsus longer than III metatarsus; palpus shorter than cephalothorax, tip of femur and patella white and covered with white scales, seen from above, patella longer than tibia, tibial apophysis small, ending in a curved tip, bulb extends on tibia, embolus a short black spine at tip.

Female. Length, 3.8 mm., ceph. 1.9 mm., abd. 2.0 mm.

Cephalothorax same as in male, eyes same, 1 very long bristle below and between a.m.e.; abdomen with the same markings; legs, I right missing, 3–4–1–2, anterior pairs only slightly enlarged, no fringe on II or III pairs, all femora with a broad dark ring at tip, spines same as in male; palpi dark with tip of femur and patella covered with white scales as in male, terminal joint with a pointed tip; epigynum, the two openings are small, round and very dark, widely separated, posterior and almost touching are two sacs very much larger than the openings that are separated by a diameter.

Holotype ♂ Cuba; Soledad, Mina Carlota, November 1927, (Creighton).

Allotype ♀ Cuba; Soledad, Mina Carlota, November 1927, (Creighton).

Paratype ♀ Cuba; Pinar del Rio, San Vicente, July, (Archer).

This pair was identified by Mr. Emerton as *Stoides aurata* (Hentz). The abdominal markings are very much like that species but the latter never has a brush of hairs on the legs. It differs from the other species of the genus found in Cuba by the much smaller size, and the brush of hairs, not a fringe, on the third tibia and metatarsus.

Corythalia parvula (Banks)

Figures 280, 282

Prostheclina parvula Banks, 1909, p. 168, pl. 45, fig. 1.

Male. Length, 4.0 mm., ceph. 2.1 mm., abd. 2.0 mm.

Cephalothorax very dark, almost black in eye area, probably in life covered with iridescent scales as a few remain; white about lateral margins and a brilliant, iridescent green on surface posterior to eyes, a recurved transverse depression between dorsal eyes from which starts the short thoracic groove, cephalothorax almost level behind groove for a distance about equal to space between dorsal and small

eyes, then it slopes abruptly to posterior margin, sides vertical; eyes, upper margins of anterior row recurved, a.l.e. about half the diameter of a.m.e., a.l.e. and p.l.e. subequal, small eyes about midway between first and third rows; quadrangle of lateral eyes narrower behind than in front and about twice as long as wide; clypeus inclined, less than a radius of a.m.e.; mandibles very dark brown with a few white scales, vertical, rather small, front slightly convex, fang groove very short, one small tooth on inferior margin, fang short and weak; sternum and mouth parts black, sternum little longer than wide, truncate in front, IV coxae touching, I and II coxae black, III and IV coxae gray; abdomen with a broad, light median stripe which, in posterior half, has irregular dark chevrons, lateral dark stripes much heavier and distinct at base, venter gray; legs, 4–3–1–2, I pair slightly enlarged, dark gray, tarsus pale, white scales on all joints but tarsus, a scant fringe of black hairs on femur, patella, tibia and metatarsus, II pair same as I pair but fringe on tibia and metatarsus only, II and III femora dark brown, other joints pale, white scales on all joints but tarsi, III patella longer than IV patella, spines, I pair, patella, 1 prolateral, tibia, ventral, spines not paired, 3 prolateral near tip, 3 retrolateral, middle spines longest, basal spines short, lateral, 0, metatarsus, ventral, 2–2, basal pair very long, lateral, 2, II pair, spines same as I pair, posterior patellae with prolateral and retrolateral spines; palpus short, femur dark brown, paler at tip, longer than tibia plus patella, tibia and patella white, covered with white hairs and iridescent scales, patella longer than tibia, tarsus dark brown covered with long black and white hairs, tibial apophysis with a slender incurving tip, a ventral lobe on tibia about the middle, against which the bulb of the palpal organ rests, embolus very short, terminal joint of right palpus missing.

Female. Length, 3.0 mm., ceph. 1.8 mm., abd. 1.7 mm.

Cephalothorax very dark, expecially about the eyes, brilliant, iridescent green scales in patches about eye area, white scales about posterior lateral margins, recurved depression between dorsal eyes, thoracic groove short; eyes same as in male; mandibles dark brown, small; sternum, mouth parts and I and II coxae dark; abdomen with a wide median pale stripe not as sharply defined as in male, posterior half with dark chevrons, lateral dark stripes broken about the middle, basal half much larger and darker as in male, venter gray, darker on sides; legs, 4–3–2–1, yellowish brown, with no scales, I and II pairs enlarged, I pair with a slight fringe of colorless hairs on patella, tibia and metatarsus as in male, spines as in male but basal pair on I tibia very small and slender, middle pair very long; epigynum a broad

septum separating two round darkened areas, on posterior margin of which are two pairs of much darker spots, one pair is probably the openings.

Holotype ♀ Cuba; Cayamas, (Baker), Banks Coll.

Allotype ♂ Cuba; Isle of Pines, Sierra de Casas, 1915, (Barbour and Brooks).

♂ Cuba; Yaguajay, (Aguayo).

Corythalia parvula (Banks) is smaller than *C. aurata* (Hentz) but they have many characters in common. Both have the first pair of legs with a scant fringe of hairs, the third and fourth pairs sub-equal, and the inferior margin of the fang groove with one small tooth; the third leg is not modified.

Corythalia squamata spec. nov.

Figures 277, 278

Male. Length, 4.5 mm., ceph. 2.2 mm., abd. 2.4 mm.

Cephalothorax black, probably in life covered with white iridescent scales as a few remain about eyes, lateral stripes of white scales on posterior half, crescent-shaped depression behind posterior eye row from which starts the short thoracic groove, thoracic portion slopes gradually from groove half way to posterior margin when it falls abruptly, many very long black hairs about anterior eye row, between and below small eyes are two pairs of long bristles; eyes, eye area covers about one-third of carapace, anterior eye row recurved by upper margins, a.l.e. more than half the diameter of a.m.e., small eyes nearer a.l.e. than to dorsal eyes, a.l.e. and p.l.e. subequal, third row of eyes not on extreme margin of carapace; quadrangle of lateral eyes narrower behind; clypeus retreating, equal to radius of a.m.e.; mandibles dark brown, covered with white scales, very slightly convex, fang groove short, slightly oblique, superior margin with two small teeth and a single row of stiff short hairs from base of fang to teeth, inferior margin with one small tooth, fang short with a very wide base; labium pale, longer than wide, with upper margin evenly curved; maxillae two-thirds longer than labium, tips rounded and much widened; sternum gray, almost round; abdomen dark gray with scattered long black hairs, about the middle a large spot of white iridescent scales and each side a much larger spot of black hairs, posterior is a pair of smaller black spots, middle and sides with scattered gray and white scales, venter pale gray with two pairs of faint

darker gray stripes; legs broken, 3–4–1–2, trochanters white, I pair enlarged, femur gray, other joints paler, thickly covered with white scales and very long black hairs but not thick enough to be called a fringe, II pair slightly enlarged, pale gray with some white scales and long hairs as on I pair, III and IV pairs, femora basal half white, all joints with long black hairs and white iridescent scales, spines, I and II pairs, patella, 0, tibia, ventral, 2–2–2, lateral, 2–2, metatarsus, ventral, 2–2, lateral, 2, III and IV pairs, patella, lateral, 2, tibia, ventral, 2 apical, lateral, 1–1, metatarsus, apical and median whorls; palpus short, seen from above patella twice as long as tibia, cymbium dark, covered with coarse dark hairs, tip of femur, patella and base of tibia covered with a thick mass of white iridescent scales, tibial apophysis small, seen laterally with a sharp point but ventrally shows only an incurving tip, ventral apophysis triangular and ventral surface covered with short black hairs; palpal organ extends in a lobe and rests against the ventral lobe of the tibia, embolus very short and straight.

Female. Length, 6.0 mm., ceph. 2.6 mm., abd. 3.3 mm.

Cephalothorax dark shining brown, with no hairs, crescent-shaped depression between posterior eye row, almost black anterior to depression, thoracic groove short; eyes, mandibles, labium and maxillae same as in male; abdomen a broad oval, dark brown with minute pale spots which may have been base of hairs that have been rubbed off, a median pale spot one third from base, and a pair of widely separated diagonal lateral bars on posterior half connected with a very narrow lateral pale line, sides pale, venter dark gray with four narrow pale lines, the outer pair meeting above the spinnerets; spinnerets slender and the inferior pair close together; legs, III right missing, 3–4–1–2, anterior pairs darker and heavier, trochanters covered with white scales, I and II femora with dark ventral distal spots which extend on sides; spines same as on male but prolateral spine on II patella; epigynum a pair of small oval openings more than a diameter anterior to fold, and separated by more than a diameter; one each side are dark round sacs beneath the skin.

Holotype ♂ Cuba; Soledad, May 1936, (Darlington).

Allotype ♀ Cuba; Soledad, May 1936, (Darlington).

Paratype ♂ Soledad, August 1931, (Banks).

Corythalia squamata differs from the other species found in Cuba in the scant fringe on the legs, the long hairs, and in the many iridescent scales on the mandibles and legs. It is very hairy. The embolus is much longer than in the other species but the abdominal markings are similar in all five species. The number of teeth on the fang groove is a

very variable character in this genus. *Corythalia squamata* has two teeth on the superior margin, the same as *C. signata* (Banks) from Puerto Rico. *C. emertoni* has no teeth on either margin, and *C. arcuata* Frang. has one on the inferior margin.

Genus Pardessus Peckham 1896

Pardessus formosus spec. nov.

Figures 283, 284

Male. Length, 4.5 mm., ceph. 2.1 mm., abd. 2.1 mm.

Cephalothorax dark brown black about anterior eye row and a second black band between dorsal eyes, white hairs about dorsal eyes and on posterior slopes, a fringe of short black hairs directed upward on lateral margin beneath dorsal eyes, cephalothorax very high, and the portion much swollen, seen from the side, highest between small eyes from which point it slopes to anterior eye row, and is apparently level for some distance posterior to dorsal eyes when it falls very abruptly to the posterior margin, a slight circular depression between dorsal eyes from which starts the very short thoracic groove, eyes, anterior row recurved, equidistant, a.l.e. less than half the diameter of a.m.e., with many long hairs on upper margins, small eyes nearer third than first row, p.l.e. slightly larger than a.l.e.; quadrangle of lateral eyes wider in front than behind; clypeus retreating, so that cephalothorax overhangs mandibles, below a.m.e. equal to a little more than a radius of a.m.e. with a thick fringe of short hairs on margin; mandibles very dark brown, iridescent, anterior surface flat, fang groove short, horizontal, superior margin with two small teeth; inferior margin with one large plate, fang short with a very thick base; labium brown, longer than wide, tip narrower than base; sternum brown, with a few long hairs, four-fifths as wide as long, anteriorly little wider than labium, pointed in front of IV coxae, IV coxae touching; abdomen oval, dull brown with a basal pale stripe and a vague pattern of black on dorsum, covered with long and short hairs and much smaller iridescent scales, muscle spots distinct, venter dull grayish-brown with four widely separated stripes of paler dots; legs, 3–4–1–2, III left missing, brown, I and II pairs enlarged, prolateral side of femora and tibiae with iridescent scales, patella, tibia and metatarsus thickly covered with black hairs and a heavy ventral fringe of black hairs, spines, patella, prolateral, 1, tibia, dorsal, 0, ventral, 2–2–2, middle and basal pairs long, prolateral, 2, metatarsus,

dorsal, 0, ventral, 2–2, basal pair very long, prolateral, 2, III femur with a dorsal crest of short black hairs, ventral fringe on patella, tibia and metatarsus, spines, patella, prolateral, 1, retrolateral, 1, tibia, dorsal, 1 basal, IV patella plus tibia not as long as III patella plus tibia, IV tibia with a dorsal basal spine, metatarsus with three whorls; palpus shorter than cephalothorax, femur with a dorsal crest of black hairs, patella not as long as diameter of joint and tibia even shorter, tibial apophysis seen laterally is a broad dark truncate lobe that rests against the cymbium, cymbium with a prolateral fringe of long black hairs, almost twice as long as tibia plus patella, palpal organ almost as long as cymbium with a semi-transparent lobe that projects from the plane of the palpus.

Holotype ♂ Cuba; Mountains North of Imias, 3,000–4,000 feet, 25–28 July, 1936, (Darlington).

With some hesitation this species is placed in the genus *Pardessus*. The genus was founded by Peckham for four species known only from females. Because of the swollen cephalothorax, it can not be placed in the genus *Corythalia*, and as the dorsal eyes are not on the extreme margin of the carapace, it does not belong in *Bythocrotus*, a genus found in Haiti.

Genus Plexippus C.L. Koch 1850

Plexippus paykulli (Audouin)

Attus paykulli Audouin, in Savigny, Descr. de l'Égypte, 1827, **22**, p. 172.
Plexippus paykulli Petrunkevitch, 1930, p. 156, figs. 140–143.

A common cosmotropical species. It is found in southern Florida and Bermuda, and has been taken at various places in Cuba. Very good figures are given in the Biologia Centrali-America, 1901, **2**, p. 240, pl. 20, fig. 21.

Sub-family PELLENINAE

Genus Pellenes Simon 1876

Pellenes coronatus (Hentz)

Attus coronatus Hentz, 1846, p. 361, pl. 22, fig. 1.
Pellenes coronatus, Peckham, 1909, p. 545, pl. 45, fig. 3.

This species belongs to the section of the genus in which the males have two long, heavy spatulate spines on the prolateral side of the first

tibia. These are lacking in the female which is recognized by the shape of the epigynum. It is found in the southern part of the United States and as far north as Long Island, New York; also in Mexico.

♂ Cuba; Soledad, 1–11 August, 1934, (Darlington).

♀ Cuba; Havana, (Cervera).

Pellenes translatus Peckham

Pellenes translatus Peckham, 1901, p. 11, pl. 3, fig. 6.
Pellenes facetus Petrunkevitch, 1930, p. 181, figs. 163-164.

Peckham described this species from a single male collected at Mandeville, Jamaica by T.D.A. Cockerell, and the type is not in the Peckham Collection now at the Museum of Comparative Zoology. He states in the original description that the specimen had been rubbed, and he gives a detailed description of the markings when dry. Emerton's drawing was made when the specimen was in alcohol. The female was described by Petrunkevitch as *Pellenes facetus* from a single specimen from Puerto Rico. Both males and females have been found at Havana. Both sexes have the same thoracic markings, the cephalic portion dark, and thickly covered with faun-colored hairs; thoracic part with a dark triangle, the apex at the thoracic groove; the broad lateral band of white hairs is present only in the male. The amount of white hairs on the clypeus evidently varies as Peckham describes the white hairs as ending before reaching the a.m.e. and leaving a dark spot in the middle of the clypeus; this may have been because the specimen was badly rubbed. In the Cuban specimen, the white hairs continue across the clypeus.

The abdominal markings vary in the two sexes, which is not unusual in the genus. The male from Havana has a median pale stripe with a clouded mark at the basal half. The basal crescent of white extends to the spinnerets as described by Peckham.

The various parts of the palpus agree with the figures of the specimen from Jamaica with the exception of a line of bristles. In the figures, these bristles are on the cymbium just above the tibial apophysis. In the Cuban specimen, they are on the ventral side of the tibia and extend on to the palpal organ. Even if the position of this group of bristles is constant, it is hardly enough to warrant the creation of a new species for the Cuban specimens.

Pellenes translatus belongs to the section of the genus with the first leg not fringed and the third patella not modified. In the Peckham

Collection there was a male wrongly identified as *Pellenes agilis* (Banks). This species is found in Florida and the first pair of legs has a heavy fringe of hairs.

♂ Cuba; Havana, (Cervera).
♀ Cuba; Havana, 12 June, 1924, (Banks).
♂ Cuba; Havana, (Baker), Peckham Coll.
♀ Cuba; Soledad, August 1931, (Banks).
♂ Cuba; Soledad, 11 August, 1934, (Darlington).

Sub-family DENDRYPHANTINAE

Genus Hentzia Marx 1883

Hentzia, Marx, 1883, p. 26.
Wala, Keyserling, 1884, p. 516.
Anoka, Peckham, Proc. Zool. Soc. London. 1894, p. 701.
Anoka, F.O.P. Cambridge, 1901, p. 255.

This is another genus in which the teeth on the fang groove differ in the male and female. The male often has two forms of mandibles, one long and porrect, with the fang correspondingly long and often sinuous, and the other with the mandibles vertical and short. The teeth on the fang groove are the same in both forms. In the female, the mandibles are short and vertical and the tooth on the inferior margin is always bicuspid. In a long series of *Hentzia palmarum* (Hentz), the number of teeth on the superior margin also varies. In some cases there is but one tooth on one mandible and two on the other, but the relative position of the tooth on the inferior margin is apparently constant. The single tooth on the lower margin varies with the species. It may be large and bicuspid or long and sharp. The spines on the anterior and posterior legs are also found to be variable. Petrunkevitch uses in his table for separating the West Indian species, the presence or absence of a prolateral spine on the first patella. This is more often found on the female than on the male, but from the material seen, it is not constant in either sex.

In the Biol. Centr. Amer., F.O.P. Cambridge gives a description of the genus apparently based on the two species known to him and he uses in his key for classification, the ventral spines on the fourth tibia, two apical and one basal. The apical pair is always present but the basal spine is often wanting. He also notes the number of spines in the apical whorl of the fourth metatarsus. In the species found in North America, there are always four, two ventral and two lateral.

The specific differences in the males are found in the position of the teeth on the fang groove and in the size and shape of the tibial apophysis of the palpus. Apparently there is little difference in the relative length of tibia and patella of the palpus. In the female, the epigynum varies in the position of the openings, round or oval, horizontal or oblique, separated by a diameter or less, and the epigastric fold, straight or deeply indented.

Hentzia antillana spec. nov.

Figures 285, 289, 294

Male. Length, 4.6 mm., ceph. 2.0 mm., abd. 2.6 mm., mand. 2.1 mm. Cephalothorax brown, black around eyes, with lateral stripes of white hairs which start as a very narrow stripe from the clypeus and widen to cover the entire sides, a pair of dark spots directly posterior to a.m.e., rather indistinct in dark specimens but very distinct in pale ones, thoracic groove short; eyes, anterior row recurved, a.m.e. almost touching, separated from a.l.e. by about a radius of latter, small eyes nearer first than third row, a.l.e. and p.l.e. subequal; clypeus very narrow below a.m.e. and covered with white hairs; mandibles slightly longer than cephalothorax, porrect, upper surface pale, flat and slightly corrugate, outer margins parallel and only slightly narrower at tip than at base, scant fringe of white hairs on outer margin, heaviest at base, superior margin of fang groove with two teeth, first, the larger, about one-third from base of fang, second, much smaller, about the middle of groove, inferior margin with a strong bicuspid tooth almost opposite first tooth on the opposite margin but slightly nearer base of fang and directed towards the fang, fang as long as groove; labium dark brown; maxillae about twice as long as labium with a distinct outer corner on upper margin but not a lobe; sternum pale, very much narrowed between first coxae; abdomen with a broad brown median stripe with a narrow stripe of white hairs each side, sides brown, venter pale; legs, I pair longest and heaviest, pale brown with a broad prolateral darker stripe, tarsi pale, fringe of clavate hairs on ventral side of femur extending on patella, spines, patella, 0, tibia, ventral, 2–2–2, not opposite or paired, prolateral spines heavier with recurved tips, first at middle of the joint, retrolateral spines very small and first a third above the base, II, III and IV pairs pale, spines, II pair, patella, 0, tibia, ventral, 2–2–1, IV tibia, ventral, 2 distal, 1 basal; palpus not as long as cephalo-

thorax, femur pale with a scant fringe of white hairs near the base, patella and tibia of equal length, tibial apophysis small with a blunt tip, tip of cymbium flattened and surrounded by a chitinous rim.

Female. Length, 5.0 mm., ceph. 2.1 mm., abd. 3.0 mm.

Cephalothorax an even chestnut-brown with a few white scales, not the lateral stripes as in the male, thoracic groove short; eyes as in the male, with the usual group of three curved bristles below the small eyes; mandibles vertical, brown, flattened in front with white scales and long white hairs, superior margin of fang groove with two small teeth, inferior margin of groove with one large bicuspid tooth; maxillae with rounded corners; sternum same as in male; abdomen with a brown mottled pattern on a pale ground, with a very distinct cross bar near tip, venter pale; legs, I pair heaviest, pale brown, spines, patella, 0, tibia, ventral, 2–2–2, not opposite but nearly the same size, prolateral basal spine one-third above the base, retrolateral spine just above the base, metatarsus, ventral, 2–2, II, III and IV pairs pale, spines, II tibia, ventral, 2–2–2, IV tibia, ventral, distal, 2, basal 1; epigynum, openings oval, strongly oblique, separated by less than their diameter, leading to dark coils near the fold.

Holotype ♂ Antigua, June, 1918, (Univ. Iowa Exped.).

Allotype ♀ Antigua, June, 1918, (Univ. Iowa Exped.).

Paratypes ♂ ♀ Antigua, (Univ. Iowa Eped.).

Paratypes ♂ ♀ Virgin Islands, Haiti and Cuba.

It is probable from the description that Petrunkevitch gives of *Wala vernalis* (Peckham) (Trans. Conn. Acad., 1930, **31**, p. 139, figures 120–129) that he had this species. *Hentzia antillana* is very different from *Anoka vernalis* Peckham, co-types of which are in the Museum of Comparative Zoology Collection. Peckham's description in the Proc. Zoöl. Soc. London, 1894, p. 701, agrees perfectly with the specimens, "falces long, horizontal, inner edges parallel for about one half their length and then diverge; at this point is a tooth, which points forwards and crosses the one on the opposite falx. The fang is long and slender and it is slightly curved at the extremity." The distal half of the mandible is plainly narrowed on the inner margin, so that the tip is about one half as wide as at the base of the fang. The bicuspid tooth is large and is very close to the base of the fang. Of the three specimens in the collection identified by Peckham, two are from St. Vincent and one is from the Barbados; all have these two teeth only. The fang is bent at right angles near the base, gradually decreasing in size with the tip curved. The three pairs of spines on the first tibia are not opposite and the basal pair are widely separated, the

prolateral spine is just below the middle and the retrolateral is less than a third from the base. *Hentzia vernalis* (Peckham) has the tooth on the lower margin of the fang groove much nearer the base of the fang, the tibial apophysis of the palpus is long, slender and sinuous, and the tip of the mandible much narrower than the base. (Cf. Fig. 288)

Hentzia audax spec. nov.

Figures 286, 290, 292

Male. Length 5.8 mm., ceph. 2.8 mm., abd. 3.2 mm., mand. 2.0 mm.

Cephalothorax bright reddish-brown with wide lateral stripes of white hairs from anterior eye row to posterior margin, a dark spot in middle of eye area, sides evenly rounded, thoracic groove very short, dorsal eyes not on extreme margin of carapace; eyes surrounded with black, anterior row recurved by upper margins, a.m.e. separated by almost a radius and from a.l.e. by more, small eyes nearer first than third row, p.l.e. smaller than a.l.e.; quadrangle of lateral eyes slightly wider behind; clypeus very narrow below a.m.e.; mandibles brown, more than two-thirds as long as cephalothorax, slightly divergent, outer margins with a fringe of white hairs, heaviest at base, inner margin with a distinct carina, dorsal surface flat and slightly corrugate, superior margin of fang groove with two teeth, first near base of fang and second much smaller midway between first tooth and tooth on inferior margin, inferior margin with a large pointed tooth slightly nearer maxillae than to base of fang; fang as long as margin, slender and tip curved; maxillae slightly divergent with a distinct lobe on outer upper angle; sternum reddish-brown, oval, narrowed anteriorly to less than diameter of coxae; abdomen oval, dark brown with widely separated lateral stripes of white hairs, entire abdomen with scattered long white hairs, venter brown; legs, I pair dark brown, largest, femur flattened laterally, near distal end a fringe of clavate hairs that extend on patella, spines, patella, 1 prolateral, tibia, ventral, 2–2–2, middle and basal pairs not opposite, prolateral row spines longer with recurved tips, lateral, 0, metatarsus, ventral, 2–2, short, distal and submedian, II, III and IV pairs pale, IV tibia, ventral, 2 small distal, 0 basal, metatarsus, apical whorl of spines, 2 ventral, 2 lateral; palpus dark, not as long as cephalothorax, femur flattened laterally with no fringe of hairs, patella and tibia of about equal length, tibial apophysis dark and curved, not slender as in *Hentzia vernalis* (Peckham) (cf. Fig. 287) and fitting in a depression on cymbium, palpal organ of the

characteristic type, widest above the middle, with the bulb filling the lower half and extending on tibia, embolus a slender black tube which starts from the lower half of the bulb and follows the contour of the cavity with the last half in a groove on the tip of the cymbium above the cavity.

Female. Length, 5.8 mm., ceph. 2.2 mm., abd. 4.0 mm.

Cephalothorax bright reddish-brown, paler in eye area, scattered white hairs on sides instead of a definite stripe of white hairs as in the male, usual group of three curved bristles below small eyes; eyes same as in male; mandibles brown, vertical, anterior surface flattened, fang groove only slightly oblique, one small tooth on superior margin, large bicuspid tooth on inferior margin; labium brown, about twice as long as wide; maxillae brown, one-third longer than labium with outer upper angle rounded, not prolonged in a lobe as in the male; sternum same as in male; abdomen reddish-brown, partly broken by three pairs of diagonal white lines which do not meet in the middle, a vague median dark stripe divided at base, sides mottled, venter paler; legs, I pair heaviest, reddish-brown, femur enlarged, spines, patella, 1 prolateral, tibia, ventral, 2–2–2, unmatched and not opposite, spines on inner row longer with recurved tips, on outer row very short and much smaller, lateral, 0, metatarsus, ventral, 2–2, II, III and IV pairs pale, spines, II pair, patella, 0, tibia, ventral, 2 apical, 1 submedian, IV tibia, ventral, 2 apical, 0 basal; epigynum of the usual type as figured, openings oval, separated by less than a diameter, almost horizontal, margin above the fold semicircular.

Holotype ♂ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Allotype ♀ Cuba; Pico Turquino, 6,000 feet, 16–21 June, 1936, (Darlington).

Paratypes 3 ♂ Cuba; Pico Turquino, 6,000 feet, (Darlington).

Hentzia audax is larger than others of the genus; the tooth on the inferior margin of the fang groove is sharp, not bicuspid, and is midway between the base and the maxillae; the tibial apophysis is much heavier than others in the genus and lacks the curved tip.

Hentzia mitrata (Hentz)

Attus mitratus Hentz, 1846, p. 363, pl. 22, fig. 9.

Wala mitrata, Peckham, 1909, p. 507, pl. 41, fig. 12, pl. 42, fig. 2.

A common species from Ottawa, Canada, south to Florida and west

to Wisconsin. Cambridge did not find it in Central America and Petrunkevitch did not report it from Puerto Rico.

♀ Cuba; Soledad, June, 1925, (Salt).

Hentzia palmarum (Hentz)

Epiblemum palmarum Hentz, Amer. Journ. Sci. Art., 1832, p. 108; reprint, p. 71, pl. 9, fig. 16.

Wala palmarum, Peckham, 1909, p. 508, pl. 42, fig. 1.

This is a common species in the eastern part of the United States from Massachusetts to Florida and west to Texas. Peckham figures and describes the two forms of males. Petrunkevitch did not find it in Puerto Rico.

♂ ♀ Cuba; Havana, (Cervera).

♀ Cuba; Holguin, Peckham Coll.

♂ ♀ Cuba; Soledad, August, 1931, (Banks).

♂ ♀ Cuba; Soledad, Trinidad Mountains, March, 1925, (Salt).

♂ ♀ Cuba; Soledad, February, 1925, (Salt and Myers).

Hentzia tibialis spec. nov.

Figures 291, 295

Male. Length, 5.1 mm., (exclusive of mand.), ceph. 2.0 mm., abd. 3.2 mm., mand. 1.1 mm.

Cephalothorax bright brown, black about eyes, a wide lateral stripe of white hairs from a.l.e. to posterior margin, golden scales between and below lateral eyes, two or three slender black bristles posterior to a.l.e., thoracic groove very short; eyes, a.m.e. largest, subcontiguous, separated from a.l.e. by more than a radius of a.l.e., small eyes nearer first than third row, a.l.e. and p.l.e. subequal; quadrangle of lateral eyes as wide behind as in front; clypeus wanting below a.m.e.; mandibles porrect, slightly narrower at tip than at base, flattened dorsally and upper surface corrugate, no lateral fringe of long hairs, superior margin of fang groove with two teeth, the larger nearer the base of the fang and a very small tooth opposite tooth on inferior margin, inferior margin with one large, sharp tooth two-thirds nearer origin of fang than base of mandible, fang long and sinuous; labium nearly twice as long as wide; maxillae dilate at outer upper angle with a blunt tooth on anterior margin above the angle, apex truncate; sternum narrowed

between I coxae to width of labium, widest between II and III coxae, IV coxae subcontiguous; abdomen, dorsum an iridescent bronze with a vague median branching dark stripe, a narrow lateral stripe of white scales meets above the spinnerets, venter dark; legs, I pair dark and larger than others, femur enlarged and flattened laterally, patella and tibia with scattered white scales, no ventral fringe on clavate hairs on tip of femur and patella, spines, patella, lateral, 0, tibia, ventral, 2–2–2, all less than diameter of joint, lateral, 0, metatarsus, ventral, 2–2, II, III and IV pairs cream white; palpus, femur, patella, and tibia white and covered with long white hairs, basal part of tarsus white, tip dark and flattened, tibia two-thirds as long as patella, tibial apophysis dark, broad and bicuspid, with lower cusp longer and sharper, palpal organ very dark, broad and deeply bilobed at apex, embolus rather shorter and heavier than in *H. palmarum* or *antillana*.

Female. Length, 6.7 mm., ceph. 2.5 mm., abd. 4.5 mm.

Cephalothorax bright brown with faint dark stripes from p.l.e. to posterior margin where they meet, lateral stripes of white hairs rather indistinct, white hairs above and between a.m.e., a pair of curved rod-like bristles below small eyes, cephalothorax narrower than in male; clypeus wanting below a.m.e. and covered with white hairs and scales below a.l.e.; mandibles vertical, superior margin of fang groove with two teeth, one nearer fang slightly larger, inferior margin with large bicuspid tooth, fang rather short; labium dark, twice as long as wide; maxillae long, only slightly widened at tip, not dilate as in male, apex rounded, not truncate; sternum dark, oval, anteriorly as wide as labium widest between II coxae, IV coxae contiguous; abdomen pale, covered with white scales, with a median dark stripe irregularly branched, including a pair of pale spots at basal third, sides irregularly spotted with small dark dots, venter pale; legs, I pair missing, others pale, IV tibia, ventral, 2 spines at apex, 1 basal; epigynum small for so large a spider, showing the same characters as others of the genus; a pair of circular openings, separated by about a radius, anterior to a dark curve above the fold.

Holotype ♂ Cuba; Soledad, 11 August, 1931, (Weber).

Allotype ♀ Cuba; Soledad, 11 August, 1931, (Weber).

Paratype ♀ Cuba; Soledad, August 1931, (Worley).

This species is much larger than *Hentzia palmarum* (Hentz) but the epigynum is smaller. In the male, the tibial apophysis of the palpus is very different as it has two cusps instead of one slender point.

Genus Icius Simon 1874

Icius wickhami Peckham

Figure 296

Icius wickhami Peckham, 1894, p. 109, pl. 10, fig. 8.
Icius floridanus Banks, 1895, p. 100.

Male. Length, 3.0 mm., ceph. 1.6 mm., abd. 1.6.mm.

Cephalothorax dark brown with scattered iridescent scales, no marginal pale stripe, moderately high, widest behind dorsal eyes, eye area level, then sloping gently to groove, where it slopes abruptly to posterior margin, thoracic groove reduced to a small dot; eyes, anterior row recurved by upper margins, a.m.e. very large, almost touching, a.l.e. less than half the diameter of a.m.e. and separated from them by less than a radius of a.l.e., small eyes one third nearer first than third row, dorsal eyes subequal with a.l.e.; eye area covers more than one-third of carapace; quadrangle of lateral eyes slightly wider behind than in front and more than half as wide as long; clypeus wanting beneath a.m.e., retreating with a very few iridescent scales; mandibles dark brown, vertical, fang groove short, superior margin with two small teeth and a row of curved setae from teeth to base of fang, inferior margin with a large bicuspid tooth opposite teeth on upper margin; labium slightly longer than wide; maxillae twice as long as labium with tips slightly dilate; sternum oval, about twice as long as wide, anteriorly narrowed to width of labium, widest between II coxae, IV coxae contiguous; abdomen very dark, almost black with scattered white scales, venter dark; legs, 1–4–2–3, I pair heaviest, coxa dark, largest, trochanter one half as long as coxa, femur dark, iridescent, flattened laterally so that dorsal edge is a rather sharp ridge, other joints paler, patella and tibia flattened dorsally, patella almost as long as tibia, both rather slender with a broad dorsal pale stripe almost covered with white scales, metatarsus dark, two-thirds as long as tibia, tarsus pale, spines, femur, 4 short inconspicuous spines on ridge, patella, 0, tibia, ventral, 2–2–2, short, less than half a diameter of the joint, not opposite, first prolateral spine about middle of the joint, lateral, 0, metatarsus, ventral, 2–2, not basal, lateral, 0, II, III and IV coxae and trochanters pale, all other joints dark, with a broad median pale stripe which is partly covered with white scales, stripes less distinct on femora, IV metatarsus a little shorter than IV tibia, spines on posterior legs very small and inconspicuous; palpus short, femur as long as patella plus tibia plus tarsus, tibial apophysis a

sharp black point, tip of cymbium flattened, palpal organ well figured by Peckham.

Female. Length, 3.5 mm., ceph. 1.5 mm., abd. 2.0 mm.

Cephalothorax bright chestnut-brown, black about the eyes, with scattered white iridescent scales, same shape as in male; eyes, mouth parts and sternum same as in male; abdomen thickly covered with white iridescent scales, except at tip of abdomen where they have been rubbed and the tip appears a dull brown, venter pale brown; legs, 1–4–2–3, paler than in male, I pair heaviest, femur bright brown with an indistinct median pale stripe, enlarged and flattened laterally, patella and tibia subequal, pale with no stripe, spines same as in male but longer, II, III and IV bright yellow with a distinct median dark stripe and narrower dark lateral stripes, posterior pairs with very few spines; epigynum with a deep notch above the epigastric fold, characteristic of *Dendryphantes;* the openings can be seen, and the dark parts beneath the skin form an area twice as long as wide.

Allotype ♀ Cuba; Soledad, August 1931, (Banks).

♂ Cuba; Havana, (Cervera).

♂ ♀ Cuba; Trinidad Mountains, Mina Carlota, 19 March, 1925, (Salt and Myers).

This species was described from two badly rubbed males from Eleuthera, an island of the Bahamas. They are now in the collection of the Museum of Comparative Zoology. About the same time, Mr. Banks received a male from Florida which he described as *Icius floridanus.* Later Peckham, in the Attidae of North America, Trans. Wisc. Acad., 1909, **16**, p. 502, pl. 41, fig. 8, gives a short description of the species, and calls attention to the bicuspid tooth on the lower margin of the fang groove. Because of this tooth, it can not be placed in the genus *Icius* but until the genera of the West Indian Salticidae are better known, it is thought best to leave it there. The arrangement of spines on the first tibia is characteristic of the genus *Dendryphantes* but the rather flat cephalothorax and the bicuspid tooth excludes it from that genus.

Genus Metaphidippus F.O.P. Cambridge 1901

Metaphidippus proximus (Peckham)

Dendryphantes proximus Peckham, 1901a, p. 327, pl. 28, fig. 3.
Dendryphantes prudens Peckham, 1901b, p. 15, pl. 4, fig. 13.

Peckham, in the original description, compares this species to

Dendryphantes capitatus (Hentz) to which it is closely related and it is evidently the Cuban representative of that group. The males are easily separated. In *M. capitatus,* the tip of the embolus is truncate with one angle prolonged in a long, slender and incurving spine and the opposite angle little more than a sharp cusp. In *M. proximus* the two angles are short, very little more than cusps, with one slightly longer. The females are not as easily separated. In the Cuban species the notch above the fold is a little deeper.

The species is evidently very abundant considering the number collected at Havana, Soledad and Holguin. None have been seen from the eastern end of the island. The specimens from Santiago de las Vegas, identified by Banks as *Dendryphantes octarus* (Hentz), are this species.

♂ ♀ Cuba; Havana, (Cervera).
♂ ♀ Cuba; Holguin, (Parish), Peckham Coll.
♂ ♀ Cuba; Soledad.
♂ ♀ Cuba; Santiago de las Vegas, (Baker), Banks Coll.

Genus Paraphidippus F.O.P. Cambridge 1901.

Paraphidippus militaris (Hentz)

Attus militaris Hentz, 1845, p. 201, pl. 17, figs. 10, 11.
Dendryphantes militaris, Peckham, 1909, p. 460, pl. 37, fig. 1.

A common species from Canada to Mexico. Petrunkevitch did not find it in Puerto Rico.

♂ ♀ Cuba; Havana, (Baker), Peckham Coll.
♂ ♀ Cuba; Soledad, 1–11 August, 1934, (Darlington).
♀ Cuba; Santiago de las Vegas, (Hauser and Horne), Banks Coll.

Genus Phidippus C.L. Koch 1846

Phidippus audax (Hentz)

Attus audax Hentz, 1845, p. 199, pl. 17, figs. 6, 7.
Phidippus regius C. L. Koch, 1846, **13**, p. 146, pl. 456, fig. 1203.
Phidippus audax, Peckham, 1909, p. 389, pl. 29, fig. 2.

This species is found from Canada south to Florida. It varies greatly in size, in the amount of fringe on the first leg, and in the size and color of the abdominal markings. Because of these variations, it

has received many names. Specimens from the south are larger, the first pair of legs proportionally longer with a heavier fringe of hairs on the first tibia, but all have the same palpus. No difference can be found between the Florida and Cuban specimens. Peckham gives excellent figures of the palpus.

It is abundant in all collections from Havana and central Cuba. Petrunkevitch did not find it in Puerto Rico or the Virgin Islands.

Phidippus cardinalis (Hentz)

Attus cardinalis Hentz, 1845, p. 200, pl. 17, fig. 9.
Phidippus cardinalis, Peckham, 1909, p. 393, pl. 29, fig. 5.

Franganillo reports this species from several localities in Cuba. In Banks Coll. there is a female from Havana.

Phidippus miniatus (Peckham)

Attus miniatus Peckham, 1883, p. 15, pl. 2, fig. 11.
Phidippus miniatus, id., 1909, p. 426, pl. 32, fig. 5.

This species is known only from females. In the collection, there are specimens from Holguin, Pinar del Rio, and Bolondron, identified by Peckham, as well as many others from Havana, Soledad and Santiago de las Vegas. It is possible that it may prove to be only a color variety of *Phidippus audax*.

Phidippus variegatus (Lucas)

Salticus variegatus Lucas, Ann. Soc Ent France, 1833, **2**, p. 473, pl. 18, figs. 1–7.
Phidippus variegatus, Peckham, 1909, p. 390, pl. 29, fig. 1.

Described from specimens from New Orleans, Lousiana, this species has been recognized from several of the southern states. Peckham in his revision of the Attidae of North America, separates it from *Phidippus audax* (Hentz) only by the larger size and the wide lateral stripes of white hairs on the cephalothorax. It is not improbable that when the genus is revised again, *audax*, *miniatus* and *variegatus* will prove only color varieties of the same species. *P. variegatus* is the oldest name.

Sub-family SITTICINAE

Genus NEON Simon 1876

NEON NIGRICEPS spec. nov.

Figures 293, 297

Male. Length, 2.0 mm., ceph. 0.9 mm., abd. 0.9 mm.

Cephalothorax shining jet black with a narrow pale yellow median stripe from dorsal eyes to posterior margin, anteriorly it is continued as an indistinct narrow line of white hairs to anterior eye row, a pale marginal stripe from below dorsal eyes, gradually widening at posterior margin where it joins the median stripe, cephalothorax high, cephalic portion level and sides almost parallel, thoracic portion continuing in same plane, then abruptly sloping to posterior margin, no thoracic groove; eyes cover two-fifths of cephalothorax, anterior row straight, eyes touching, a.m.e. nearly twice the diameter of a.l.e., a scant fringe of long hairs on upper margin, small eyes nearer first than third row and not on extreme margin of carapace, p.l.e. and a.l.e. subequal, p.l.e. on margin of carapace; quadrangle of lateral eyes wider in front than behind; clypeus below a.m.e. less than a radius of a.m.e.; mandibles black, small, vertical, one small tooth on inferior margin of fang groove, fang small and weak; labium slightly wider than long; maxillae two-thirds as wide as long, sides almost parallel; sternum colorless, two-thirds as wide as long, slightly convex, only slightly narrowed in front of second coxae, fourth coxae separated by less than a diameter; abdomen with four equal black stripes separated by three pale stripes of the same width, many coarse hairs, venter pale, spinnerets black; legs, 1–4–3–2, colorless and rather short, I pair slightly enlarged, spines, tibia, ventral, 2–2–2, middle pair half the length of joint, first pair half their length above base, third pair their length below tip, lateral, 0, metatarsus, ventral, 2–2, II tibia, ventral, 1–1, serially metatarsus, ventral, 2–2, posterior or tibiae with few spines about tip in an interrupted whorl; palpus short, tip of femur, patella and tibia covered with white hairs, tibia shorter than patella, less than half as long as wide, with a short, truncate apophysis beneath palpal organ; palpal organ distorted and protruding from cavity, probably the result of the killing agent, embolus appears as a short, black spine near the tip and directed outward.

Female the same size and marked the same as the male, except that the median yellow stripe extends about half way between the eye rows;

palpus with the last two joints slightly enlarged; epigynum shows two darkened oval areas, with a pair of circular clear spots at the base which are probably the openings, anteriorly is a pair of oblique dark ovals close together.

Holotype ♂ Cuba; Soledad, Vilches pasture, 3 July, 1932, (Bates and Fairchild).

Allotype ♀ Cuba; Soledad, Vilches pasture, 3 July, 1932, (Bates and Fairchild).

Paratypes 3♀ Cuba; Soledad, Vilches pasture, July 1932, (Bates and Fairchild).

This small species was collected from a Berlese trap. It is smaller than *Neon nelli* Peckham found in North America, and has quite different markings as well as distinct palpus and epigynum.

Sub-family MARPISSINAE

Genus Hyctia Simon 1876

Hyctia pikei Peckham

Hyctia pikei Peckham, 1889, p. 79, pl. 1, fig. 59, pl. 4, fig. 59, pl. 5, fig. 59; id., 1909, p. 488, pl. 39, fig. 7, pl. 40, fig. 8.

This species is found on the coast from Massachusetts to Florida. In the Peckham Collection there are males from Holguin collected by Parish and from Havana collected by Baker. In a small collection from Havana by Cervera are both males and females. It has been found during July at various places about Soledad.

Genus Marpissa C. Koch 1846

Marpissa bivittata (Dufour)

Salticus bivittatus Dufour, Ann. Sci. Nat., 1831, p. 15, pl. 2, fig. 5.
Salticus melanognathus Lucas, 1838, p. 29, pl. 7, fig. 4.
Marpissa melanognathus, Peckham, 1909, p. 483, pl. 39, fig. 3, pl. 40, fig. 3.

This is a common cosmopolitan species and has been described and figured many times. It is found in the southern part of the United States, Central America, Panama, Brazil, Paraguay, Bermuda, and has been reported from most of the islands in the West Indies. Petrunkevitch figures and describes it in his paper on Puerto Rican Spiders.

♂ ♀ Cuba; Havana, (Baker), Banks Coll.
♂ Cuba; Trinidad Mountains, 10 March, 1925, (Salt).
♂ Cuba; Pina del Rio, San Vicente, July, (Archer).
♀ Cuba; Soledad, 8 August, 1931, (Worley).

APPENDIX

Other Spiders Reported From Cuba

For the sake of completeness, all other spiders reported from Cuba are given below in a systematic list. In no case have specimens been examined. An asterisk (*) before the name indicates Cuba as the type locality. In every case the author and year of description are given. A second name and date is a reference to the person reporting the species from Cuba. In some cases, at least, new species will prove to be synonyms, and in others species from various parts of the Old World or the northern United States will prove to be errors of determination.

Sub-order MYGALOMORPHAE

Family BARYCHELIDAE

Sub-family DIPLOTHELINAE

*Dimazion fulvus Frang., 1926

Sub-family LEPTOPELMATINAE

*Bistrigus muticus Frang., 1930
*Leptopelma cubana Frang., 1930
Psalistops corozali Petr., 1929; Frang., 1934
*Stothis maculata Frang., 1930
*Stothis spinosa Frang., 1930
*Troglothele coeca Fage, 1929

Family THERAPHOSIDAE

Sub-family ISCHNOCOLINAE

*Cyrtopholis anacanthus Frang., 1934
*Cyrtopholis debilis Frang., 1931
*Cyrtopholis debilis *var.* bispinosa Frang., 1931
*Cyrtopholis implumis Frang., 1931
*Cyrtopholis innocuus (Ausserer), 1871
*Cyrtopholis plumosis Frang., 1931
*Cyrtopholis unispinosus Frang., 1926
*Hapalopinus cubanus Simon, 1903
*Ischnocolus denticulatus Frang., 1930
Schizopelma bicarinatum F. O. P. Camb., 1897; Frang., 1926
*Stichoplastus obsoletus Frang., 1934

Sub-family THERAPHOSINAE

Citharacanthus longipes F. O. P. Cambr., 1897; Frang., 1934
*Citharacanthus longipes *var.* niger Frang., 1931

Sub-order ARACHNOMORPHAE

Family FILISTATIDAE

*Filistata cubaecola Lucas, 1857
*Filistata polita Frang., 1936
Filistata pulchella Simon; Frang., 1931
Filistata testacea Latreille, 1810; Frang., 1931

Family OECOBIIDAE

Oecobius annulipes Lucas, 1846; Frang., 1926
Oecobius concinnus Simon, 1892; Frang., 1926

Family PISAURIDAE

*Dolomedes fuscus Frang., 1931

Family LYCOSIDAE

*Lycosa ovalata Frang., 1930
*Lycosa rostrata Frang., 1930

Family OXYOPIDAE

*Sphasus poeyi Lucas, 1857
Oxyopes argyrotrichius Mello-Leitao; Frang., 1936
Oxyopes heterophthalmus (Latreille), 1804; Frang., 1926
Oxyopes pallidus (C. Koch), 1839; Frang., 1926

Family LEPTONETIDAE

Sub-family OCHYROCERATINAE

*Theotima fallax Fage, 1912
Theotima radiata Simon, 1891; Fage, 1929

Family SICARIIDAE

Sub-family PLECTREURINAE

*Plectreurys globosa Frang., 1931

Sub-family SCYTODINAE

Scytodes pallida Dolsch.; Frang., 1926
Scytodes thoracica (Latreille), 1804; Roig., 1911

Family PHOLCIDAE

Sub-family PHOLCINAE

Crossopriza pristina Simon; Frang., 1926
*Crossopriza sex-signata Frang., 1926
*Modisimus coerulescens Frang., 1931

Family THERIDIIDAE

Sub-family LATRODECTINAE

*Latrodectus albomaculatus Frang., 1930

Sub-family ARGYRODINAE

Conopistha argyrodes (Walck.); Frang., 1930
Conopistha cancellatus (Hentz) 1850; Roig, 1911
Conopistha furcata O. P. CAMBR., 1898; Frang., 1930

Sub-family THERIDIINAE

Theridion antillanum Simon, 1894; Frang., 1936
*Theridion castaneum Frang., 1931
*Theridion formosum (Clerck), 1757 *var.* serratum Frang. 1936
*Theridion fuscum Frang., 1930
Theridion simile (Clerck), 1757; Frang., 1930
*Theridion triangulare Frang., 1936

Family LINYPHIIDAE

Sub-family LINYPHIINAE

*Bathyphantes semicincta Banks, 1914

Sub-family ERIGONINAE

*Ceratinopsis ruberrima Frang., 1926

Family ULOBORIDAE

Sub-family ULOBORINAE

*Uloborus geniculatus (Olivier) *var.* altissimus Frang., 1926
*Uloborus geniculatus (Olivier) *var.* humilis Frang., 1926
*Uloborus geniculatus (Olivier) *var.* quadripunctatus Frang., 1926

*Uloborus geniculatus (Olivier) *var.* similis Frang., 1926

Family DEINOPIDAE

*Deinopis bituberculatus Frang., 1930
*Deinopis tuberculatus Frang., 1926

Family ARGIOPIDAE

Sub-family ARGIOPINAE

*Argiope argenta Fabr. *var.* nigra Frang., 1926
*Geo decoratata Thorell *var.* varians Frang., 1926
*Gea integra Frang., 1930
*Gea lineata Frang., 1926
*Gea partita Frang., 1930
*Gea subarmata Thorell *var.* maculata Frang., 1930

Sub-family ARANEINAE

*Araneus aequiangulus Frang., 1930
*Araneus aequiangulus *var.* ochraceus Frang., 1930
*Araneus anuncinatus Frang., 1930
*Araneus anuncinatus *var.* depilosus Frang., 1930
*Araneus anuncinatus *var.* ochrorufus Frang., 1931
Araneus audax (Blackwall), 1863; Frang., 1931
*Araneus bipunctatus Frang., 1931
*Araneus excavatus Frang., 1930
*Araneus fistulosus Frang., 1930
*Araneus fuligineus (Walck.) *var.* romboidalis Frang., 1930
*Araneus fuligineus (Walck.) *var.* sanguineus Frang., 1930
*Araneus lineatus Frang., 1931
*Araneus nephiloides O. P. Cambr., 1889, *var.* trapezoidalis Frang., 1930
*Araneus niger Frang., 1936
*Araneus perfoliatus Frang., 1930

Araneus sclopetarius Clerck, 1757; Frang., 1926
Araneus sericatus Clerck, 1757; Frang., 1930
*Araneus sulphureus Frang., 1930
*Cubanella nidicola Frang., 1926=Neoscona nidicola (Frang.), 1936
*Cubanella recta Frang., 1930=Neoscona recta (Frang.), 1936
Cyclosa diversa (O. P. Cambr.), 1894; Frang., 1936
Cyclosa index O. P. Cambr., 1889; Frang., 1930
*Cyclosa quadrituberosa Frang., 1936
*Edricus crassicauda (Keys.), 1865, *var.* albotuberculatus Frang., 1936
*Edricus crassicauda *var.* nigrotuberculatus Frang., 1936
*edricus crassicauda *var.* ruber Frang., 1936
*Eustala anastera (Walck.), 1837, *var.* veriformis Frang., 1931
*Eustala procurva Frang., 1936
*Eustala thorelli (MacCook), 1893; Frang., 1936
Larinia lineata (Lucas), 1841; Frang., 1930
*Mangora fasciolata Frang., 1936
Mangora picta O. P. Cambr., 1889; Frang., 1936
Mangora placida (Hentz), 1847; Frang., 1936
Mastophora conifera (Holmb.); Frang., 1936
Mastophora cornigera (Hentz), 1850; Frang., 1936
Mastophora extraordinaris (Holmb.); Frang., 1936
*Neoscona paralela Frang., 1931
*Salassima alobata Frang., 1931=Edricus?
Singa niticola (C. Koch), 1845; Frang., 1926
*Spintharidius viridis Frang., 1926

Sub-family METINAE

Chrysometa tenuipes (Keyserling), 1863; Frang., 1930
*Meta serrana Frang., 1930
Pseudometa albomaculata (O. P. Cambr.), 1889; Frang., 1930
Pseudometa decolorata (O. P. Cambr.), 1889; Frang., 1930

Sub-family TETRAGNATHINAE

*Alcimosphenus rufoniger (Frang.), 1930=Acusilas
Tetragnatha cylindrica (Walck.), 1837; Frang., 1926
Tetragnatha extensa (Linn.), 1758; Frang., 1930
Tetragnatha laboriosa Hentz, 1850; Frang., 1931
Tetragnatha longa O. P. Cambr., 1889; Frang., 1930

Tetragnatha mexicana Keys., 1865; Frang., 1930
Tetragnatha trichodes Thorell, 1878; Frang., 1926

Sub-family GASTERACANTHINAE

*Gasteracantha cancriformis *var.* alba Frang., 1936
*Gasteracantha cancriformis (Linn.), 1767, *var.* aurata Frang., 1926
*Gasteracantha cancriformis *var.* nigra Frang., 1926
Gasteracantha hexacantha (Fabr.), 1787; Banks, 1909
*Micrathena laminaris Frang., 1930
*Micrathena mammillata (Butler) *var.* tuberculata Frang., 1930
Micrathena peruana (Tacz.), 1879; Frang., 1931
Micrathena reduviana (Walck.), 1837; Frang., 1930
*Micrathena sexacantha Frang., 1930

Family CTENIDAE

Sub-family CTENINAE

*Celaetycheus fulvorufus Frang., 1930
*Celaetycheus fulvorufus *var.* afoliatus Frang., 1931
*Ctenus anclatus Frang., 1931
*Ctenus cruciatus Frang., 1930
Ctenus dubius Walck., 1805; Frang., 1926
Ctenus ensiger F. O. P. Cambr., 1900; Frang., 1926
Ctenus excavatus F. O. P. Cambr., 1900; Frang., 1930
*Ctenus gigas Frang., 1931
Ctenus hibernalis Hentz, 1844; Banks, 1909
*Ctenus impressus Frang., 1930
*Ctenus maculatus Frang., 1931
Ctenus rufibarbis (Perty), 1833; Frang., 1930
*Ctenus variabilis Frang., 1931
*Cupiennius arboreus Frang., 1934
*Cupiennius pilosus (Frang.) = Ctenus, 1930

Family GNAPHOSIDAE

*Callilepis grisea Banks, 1914

Family SPARASSIDAE

Sub-family SPARIANTHIDINAE

*Decaphora trabiformis Frang., 1931
*Stasina rangelensis Frang., 1936

Sub-family MICROMMATINAE

*Olios bicolor Banks, 1914

Sub-family HETEROPODINAE

Heteropoda longipes Koch; Frang., 1934

Family SELENOPIDAE

*Selenops aequalis Frang., 1934

Family THOMISIDAE

Sub-family STEPHANOPSINAE

Erissus validus Simon; Frang., 1934

Sub-family PHILODROMINAE

*Tibellus insularis Gertsch, 1933

Sub-family MISUMENINAE

*Misumena picta Frang., 1926
*Misumena quadrivulvata Frang., 1926
Thomisus onustus Walck.; Frang., 1926

Family CLUBIONIDAE

Sub-family CLUBONINAE

Clubiona pallidula (Clerck), 1757; Frang., 1931
*Clubiona tenera Frang., 1934
*Clubiona tenuis Frang., 1934
Matidia attenuata (O. P. Cambr.), 1893; Frang., 1930
Macerio flavus (Nicolet), 1849; Frang., 1930
Strotarchus nebulosus Simon, 1888; Frang., 1930
*Strotarchus striatus Frang., 1934

Sub-family ANYPHAENINAE

Anyphaena accentuata (Walckenaer), 1802; Frang., 1930
*Anyphaena pallidula Frang., 1930
*Aysha fusca Frang., 1926
Aysha minuta F. O. P. Cambr., 1900; Frang., 1926

Aysha septena Frang., 1934
Aysha valvula F. O. P. Cambr.; Frang., 1926
Gayenna americana Nicolet, 1849; Frang., 1926
Wulfila pallida O. P. Cambr., 1895; Frang., 1926
*wulfila pretiosa Banks, 1914
*Wulfila sanguinea Frang., 1931
*Wulfila tauricornea Frang., 1934
Wulfina tenuissima Simon, 1896; Frang., 1930
*Wulfila tincta Frang., 1930

Sub-family LIOCRANINAE

*Syrisca agelenoides Frang., 1926
*Syrisca insularis (Lucas), 1857; Frang., 1926

Sub-family CORINNINAE

*Corinna aberrans Frang., 1926
*Stethorrhagus mandibulatus Frang., 1930
*Stethorrhagus striatus Frang., 1926
Trachelas ruber Keys., 1887; Frang. 1930=Trachelas tranquillus (Hentz), 1847

Family SALTICIDAE

Sub-family LYSSOMANINAE

Lyssomanes nigropictus Peckham, 1888; Frang., 1930
Lyssomanes portoricensis Petr., 1930; Frang., 1934
Lyssomanes viridis (Walck.), 1837; Frang., 1936

Sub-family MYRMARACHNINAE

*Sarinda glabra Frang., 1930
Simonella myrmeciaeformis (Tacz.), 1871; Frang., 1930

Sub-family SPILARGINAE

*Emathis unispina Frang., 1930

Sub-family HASARIINAE

*Hasarius bisetatus Frang., 1930
*Tariona maculata Frang., 1930

Sub-family MAEVIINAE

Fuentes pertinax Peck., 1894, Frang., 1930

Sub-family CYTAEINAE

Pselcis latefasciata Simon, 1903; Frang., 1930
*Nagaina olivacea Frang., 1930

Sub-family PLEXIPPINAE

*Corythalia arcuata Frang. *var.* fulgida Frang., 1930

Sub-family HELIOPHANINAE

*Pelegrina geniculata Frang., 1930

Sub-family DENDRYPHANTINAE

*Dendryphantes variegatus *var.* limbatus Frang., 1930
Phidippus ruber Keys., 1884; Frang., 1926=P. mccooki Peck.
Hentzia peckhami (Cockerell), 1893; Frang., 1934

Sub-family MARPISSINAE

Cerionesta luteola (Peck.), 1893; Frang., 1934
*Menemerus depressus Frang., 1930
*Menemerus ochraceus Frang., 1930
*Menemerus proximus Frang., 1934

Sub-family PLEXIPPINAE

*Paraplexippus quadrisignatus Frang., 1930
*Paraplexippus sexsignatus Frang., 1930

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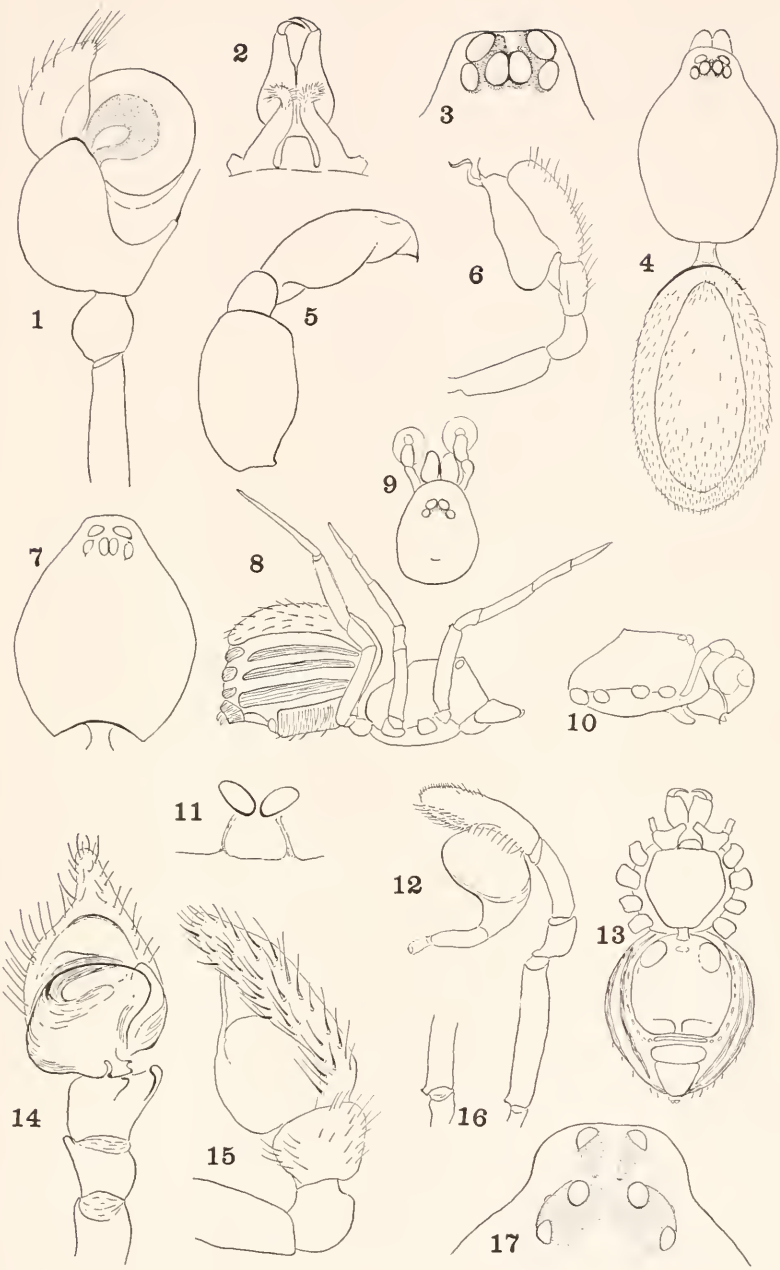
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Fig. 18. Lycosa atlantica Marx, left palpus, ventral view.
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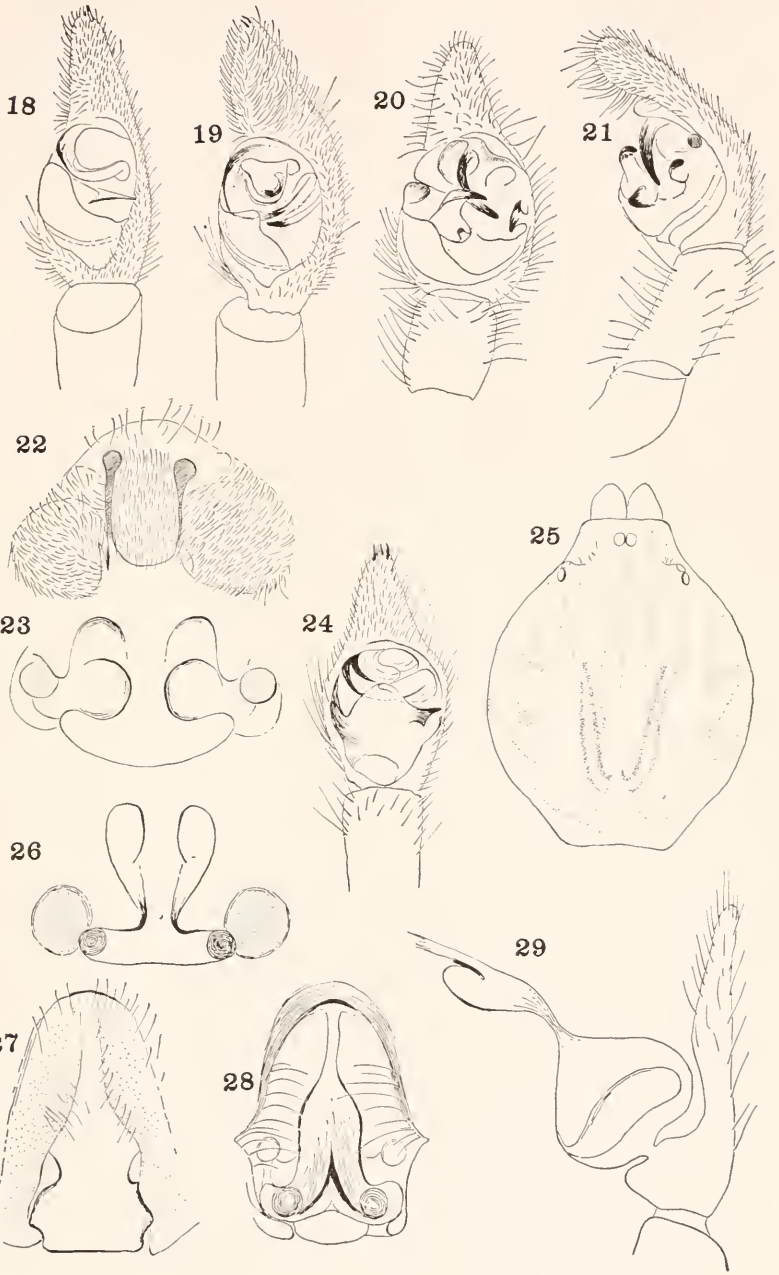
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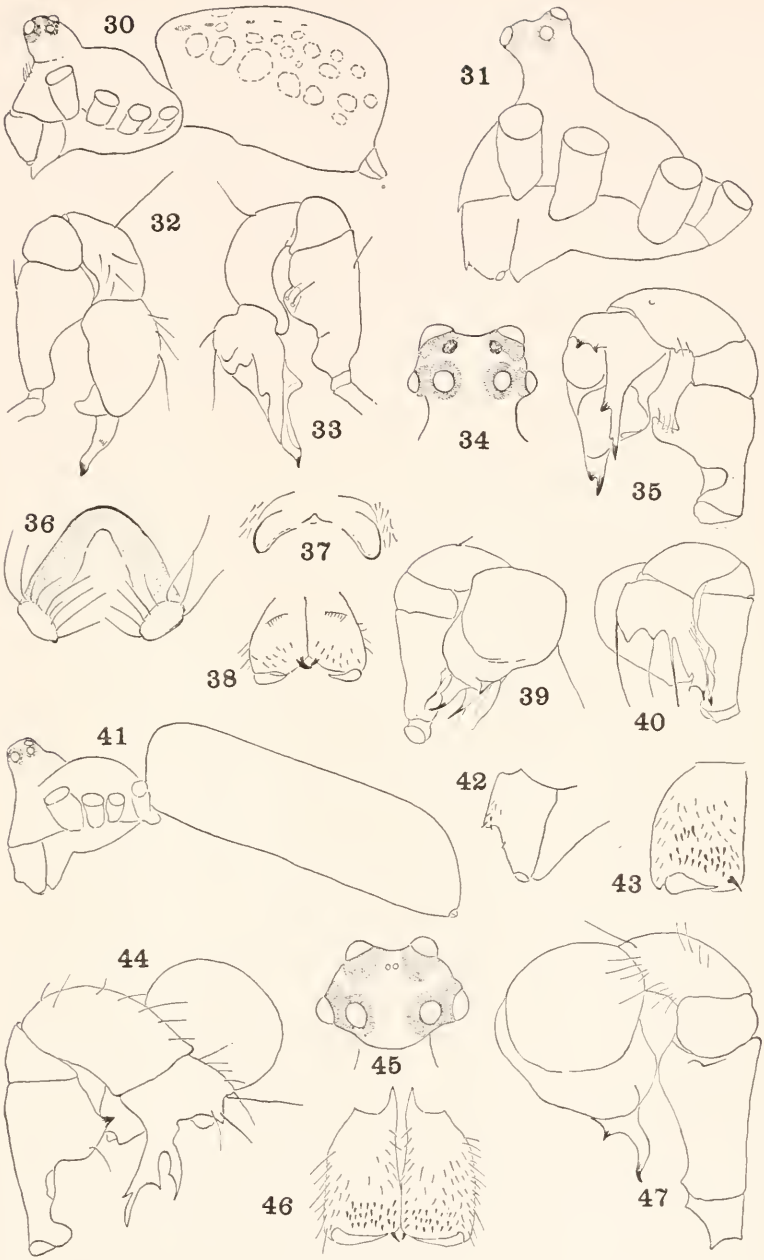
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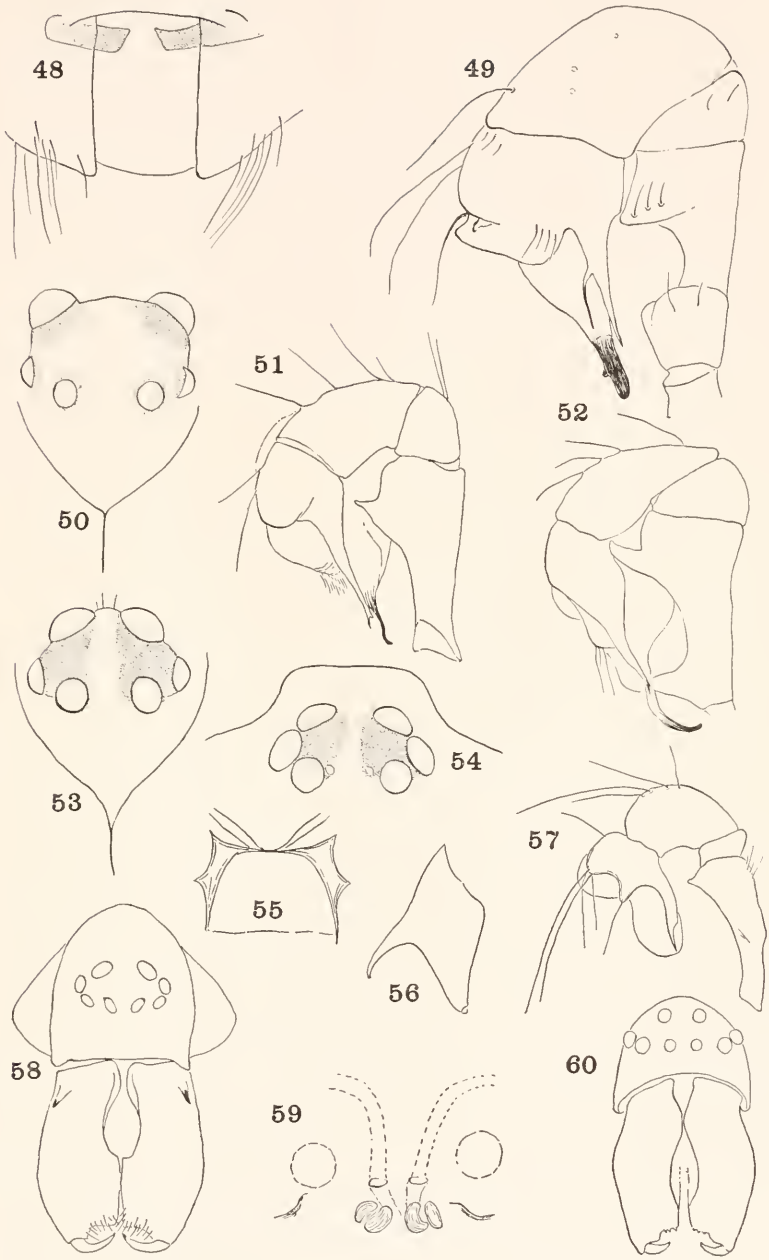
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Fig. 61. Dictyna flavipedes spec. nov., left palpus, ventral view.
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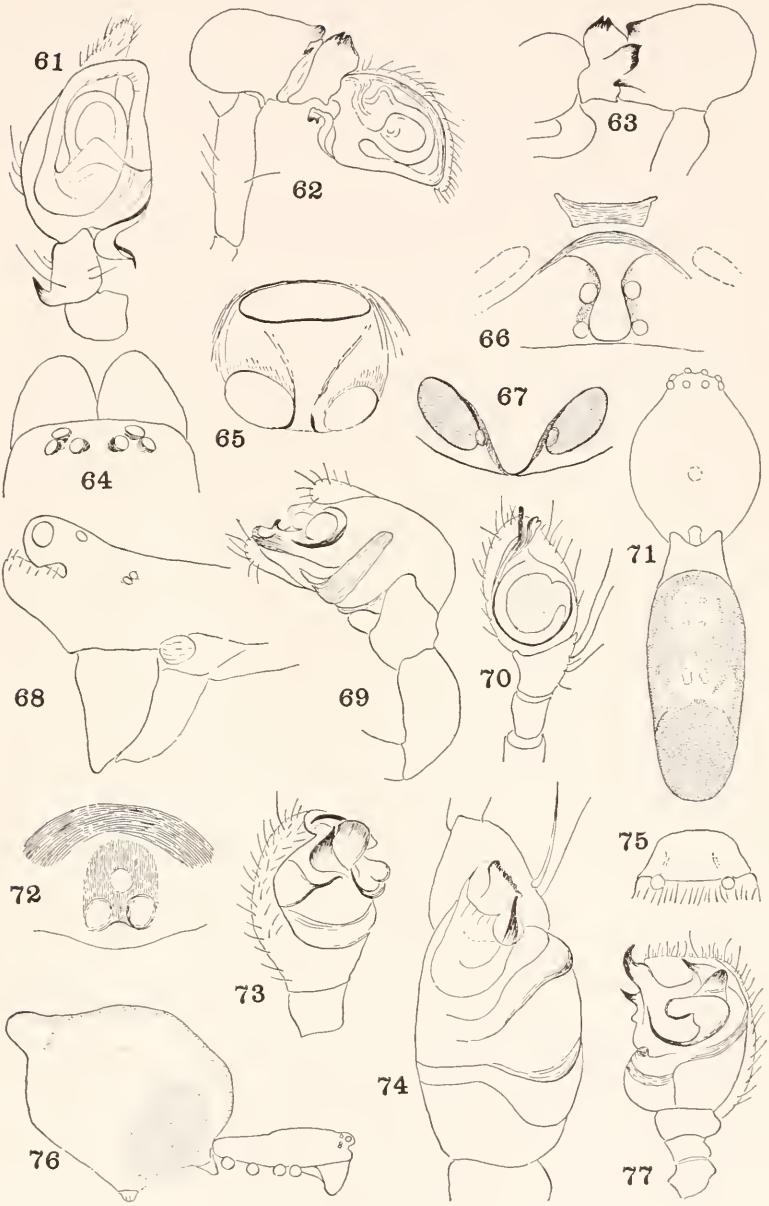
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Fig. 78. Chrysso albomaculata O. P. Camb., left palpus, ventral view.
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Fig. 90. Nesticus antillanus spec. nov., left palpus, ventral view.

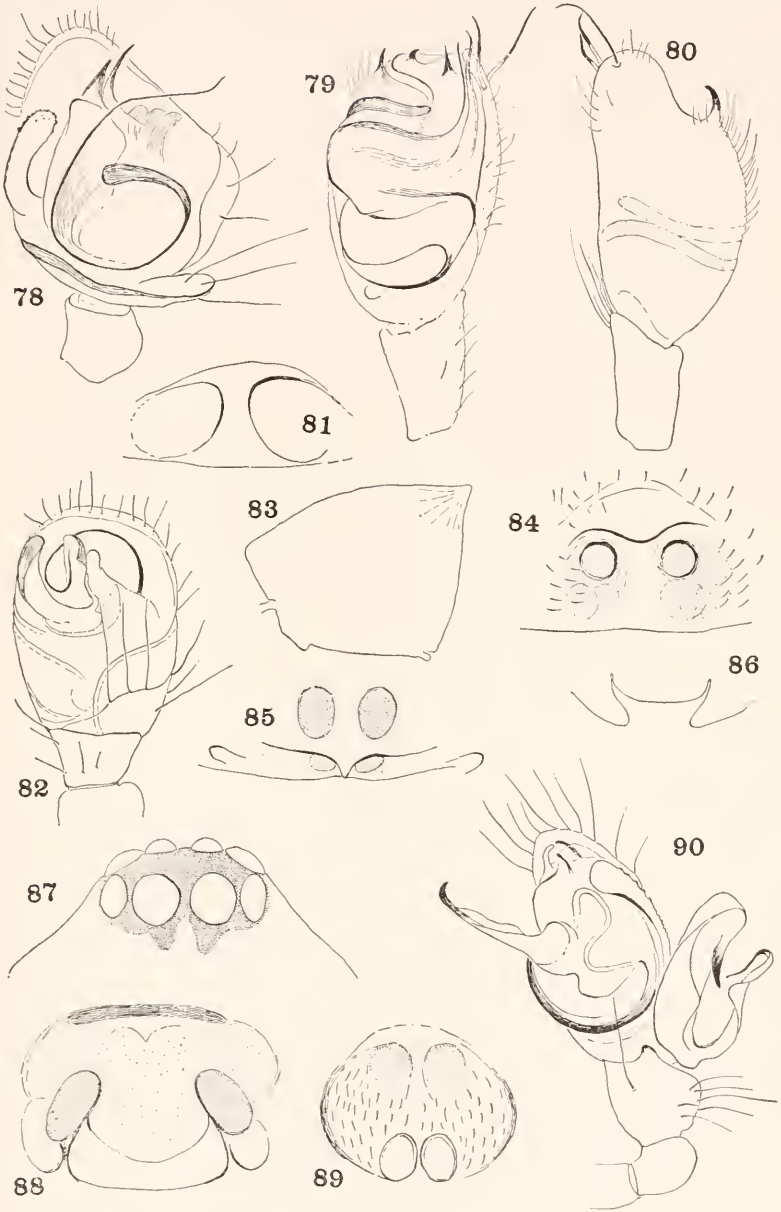
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Fig. 91. Ceraticelus nigripes spec. nov., male, dorsal view.
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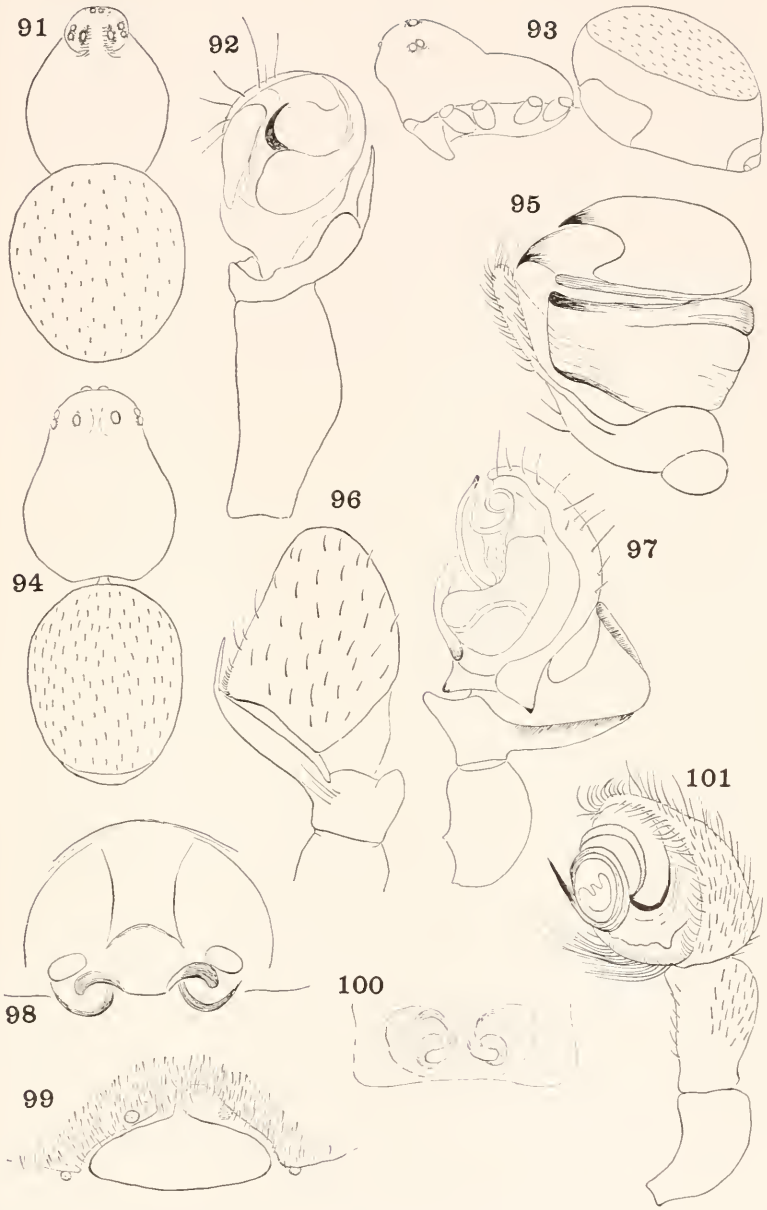
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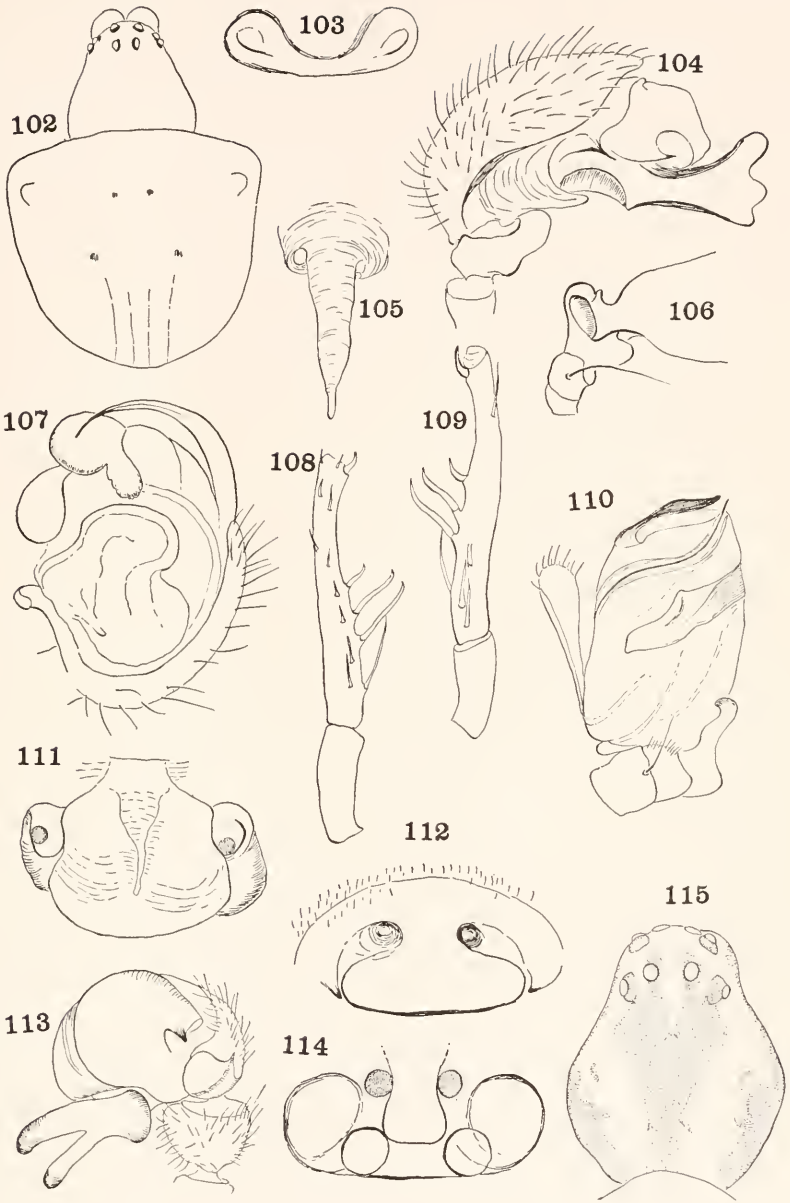
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Fig. 116. Lucarachne tibialis spec. nov., right palpus, ventral view.
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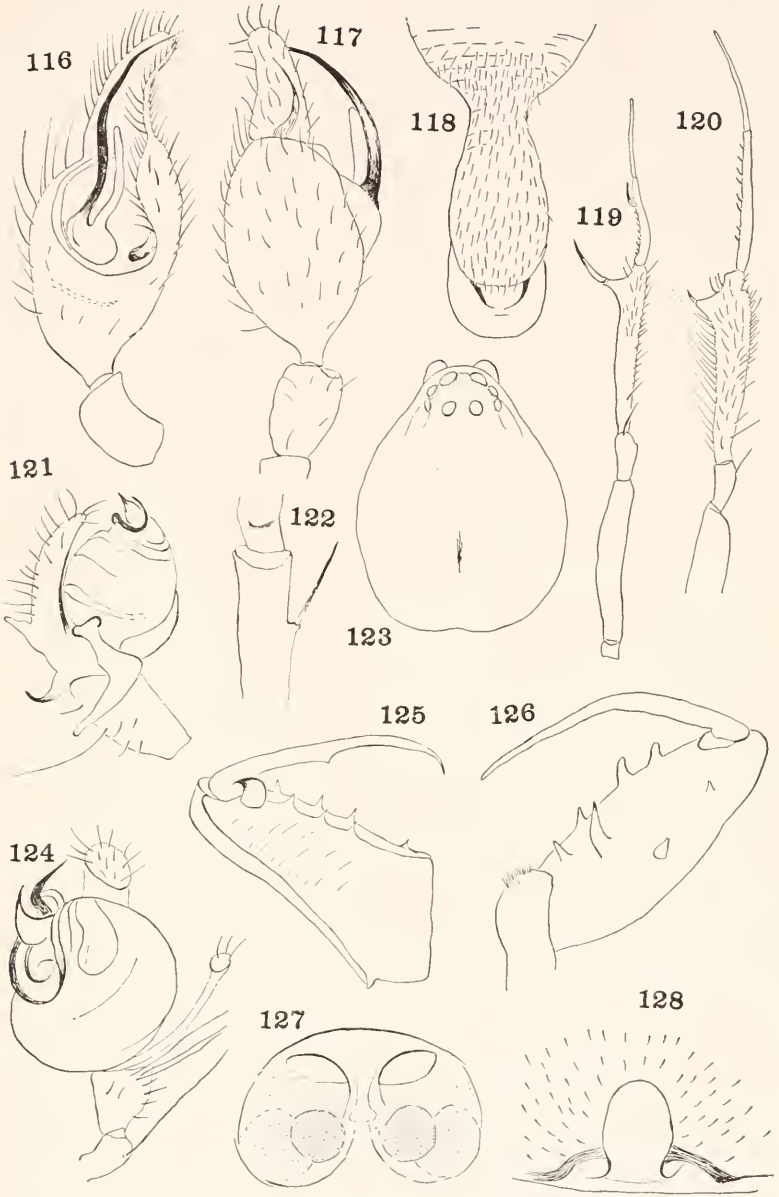
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Fig. 129. Leucauge spiculosa spec. nov., left palpus, ventral view.
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Fig. 138. Micrathena cubana (Banks), male, dorsal view of abdomen.
Fig. 139. Micrathena spec., male, dorsal view of abdomen.
Fig. 140. Micrathena militaris (Fabr.), male, dorsal view of abdomen.
Fig. 141. Micrathena forcipata (Thorell), male, dorsal view of abdomen.
Fig. 142. Micrathena mammillata (Butler), male, dorsal view of abdomen.

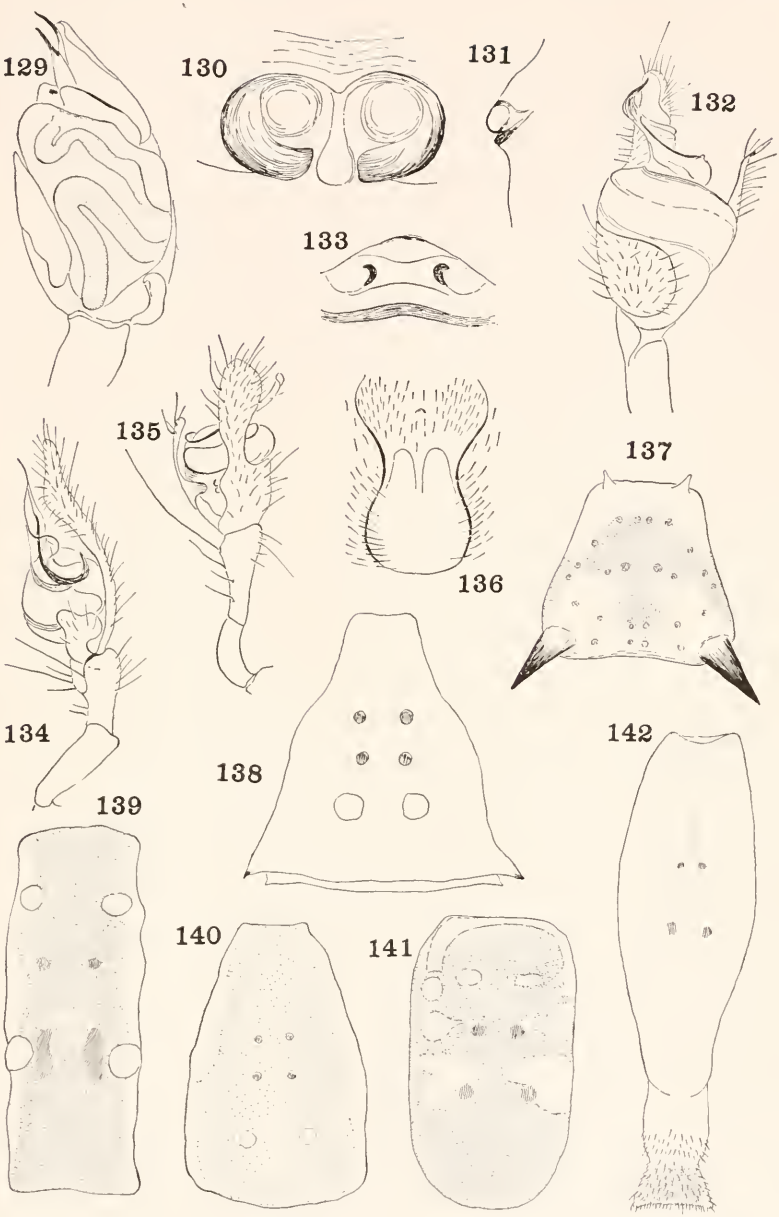
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PLATE 11

PLATE 11

Fig. 143. Micrathena spec., left palpus, prolateral view.
Fig. 144. Micrathena cubana (Banks), left palpus, prolateral view.
Fig. 145. Micrathena militaris (Fabr.), left palpus, prolateral view.
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Fig. 155. Micrathena mammillata (Butler), epigynum.
Fig. 156. Ctenus vernalis spec. nov., left palpus, ventral view.

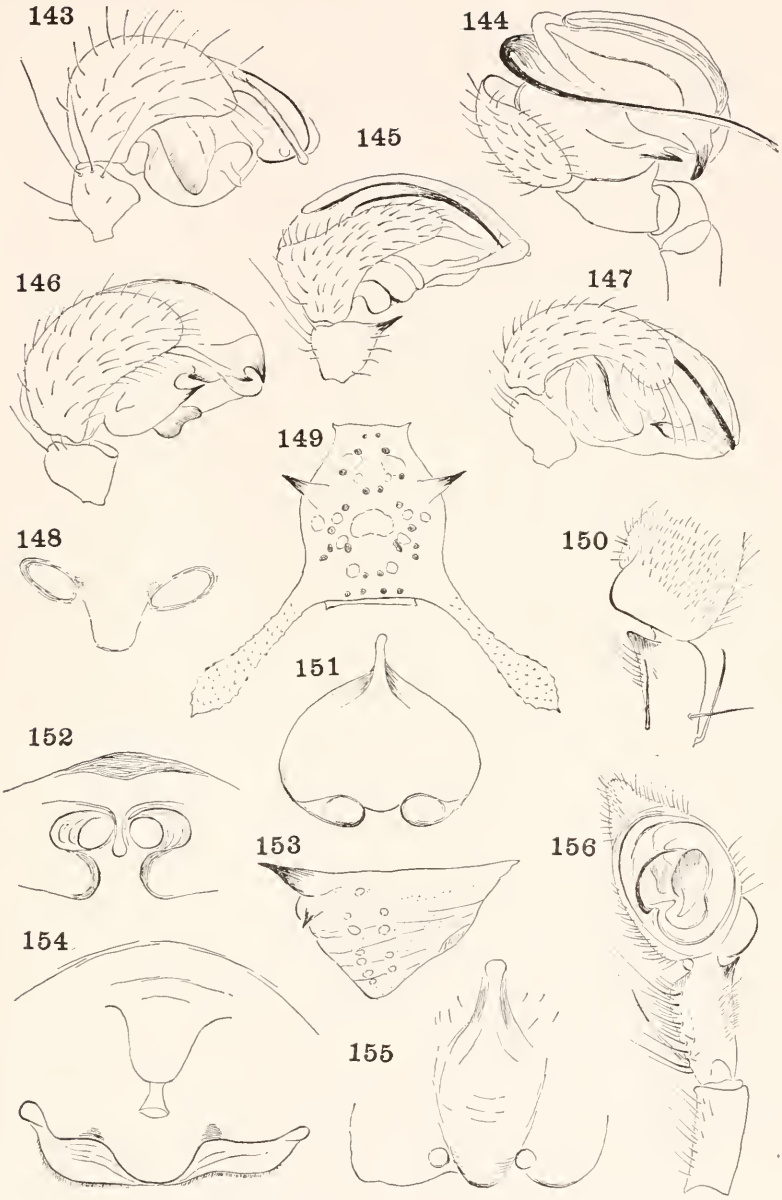
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PLATE 12

PLATE 12

Fig. 157. Celaetycheus cabriolatus Frang., left palpus, ventral view.
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Fig. 170. Paratheuma isolata spec. nov., left palpus, ventral view.

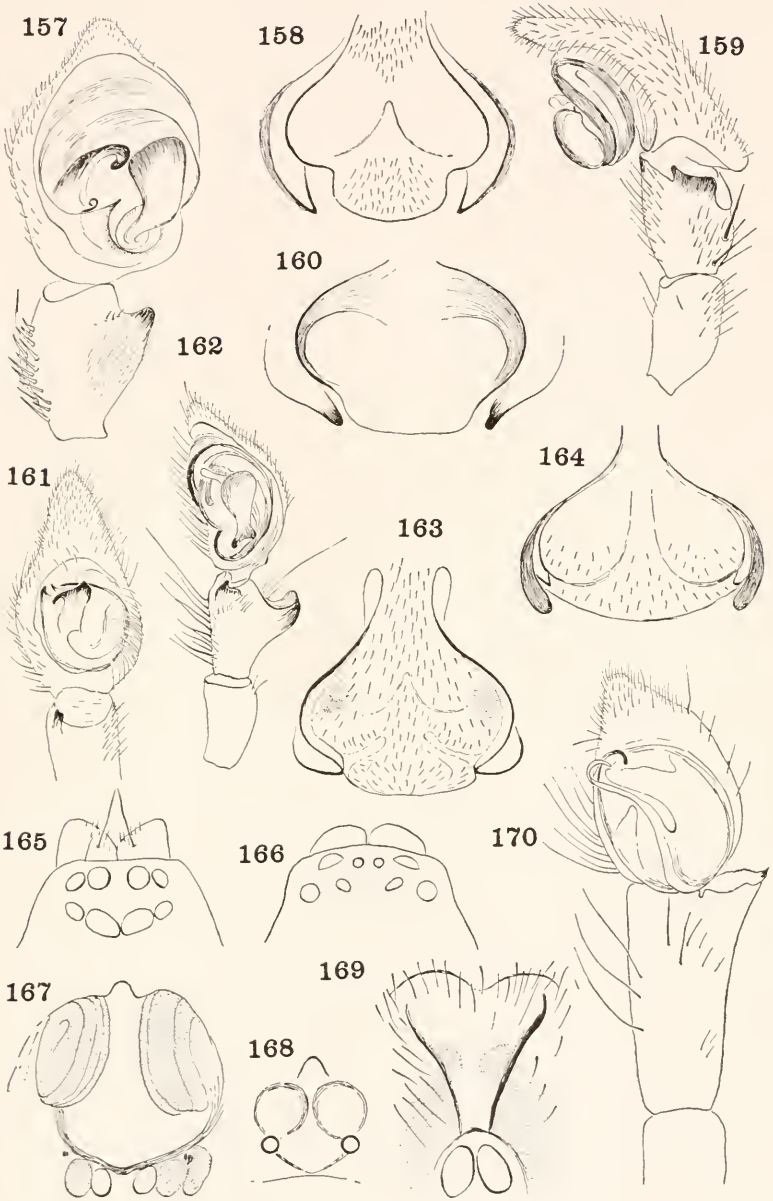
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Fig. 171. Poecilochroa minuta (Banks), left palpus, retrolateral view.
Fig. 172. Eilicina cincta (Banks), female, dorsal view of eyes.
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Fig. 181. Selenops formosus spec. nov., epigynum.
Fig. 182. Stasina lucasi spec. nov., epigynum.
Fig. 183. Selenops timidus spec. nov., epigynum.
Fig. 184. Selenops submaculosus spec. nov., left palpus, ventral view.

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Fig. 185. Isaloides toussanti Banks, male, dorsal view of eyes.
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Fig. 187. Onocolus granulata spec. nov., left palpus, retrolateral view.
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Fig. 189. Isaloides toussanti Banks, Left palpus, ventral view.
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Fig. 191. Misumenops bellulus (Banks), epigynum.
Fig. 192. Misumenops bellulus (Banks), left palpus, ventral view.
Fig. 193. Anyphaena insulana spec. nov., epigynum.
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Fig. 196. Clubiona crinophora Frang., epigynum.
Fig. 197. Majellula pulchra spec. nov., male, dorsal view of eyes.
Fig. 198. Xysticus laticeps Bryant, left palpus, retrolateral view.

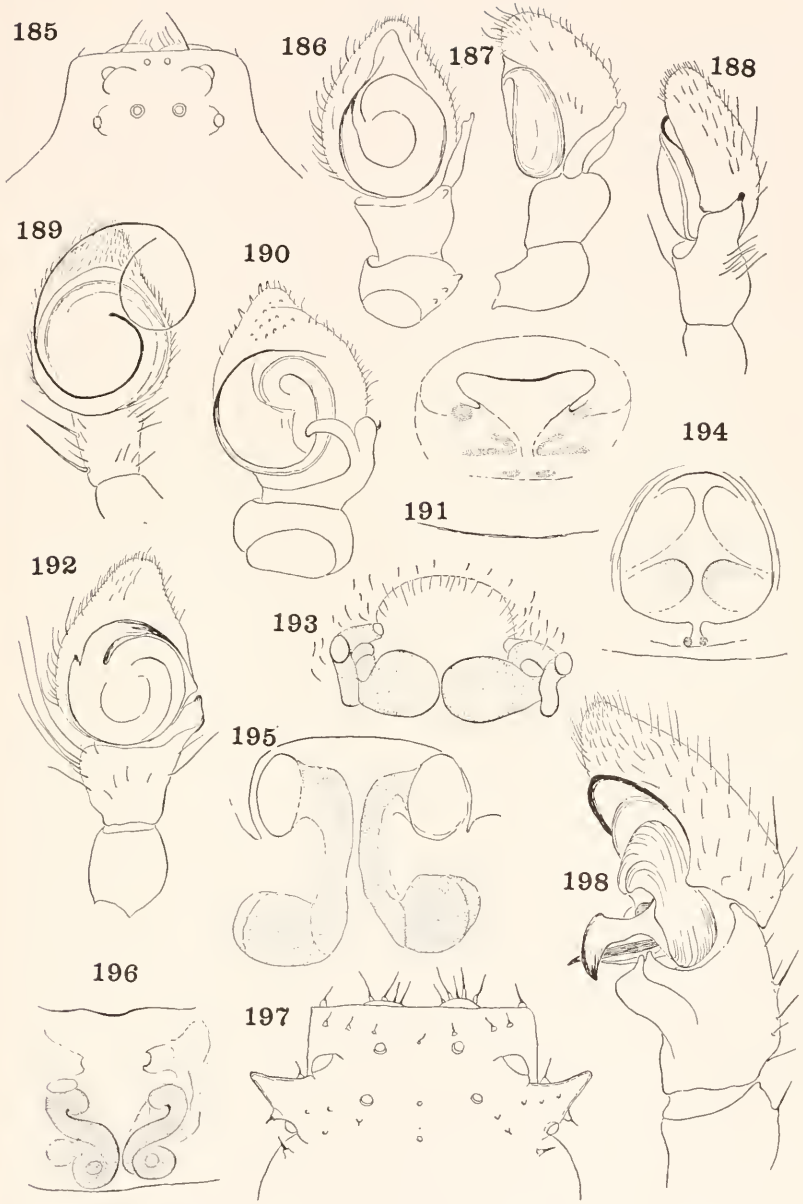
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PLATE 15

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Fig. 199. Clubiona albicans (Frang.), left palpus, prolateral view.
Fig. 200. Clubiona albicans (Frang.), left palpus, retrolateral view.
Fig. 201. Clubiona juana spec. nov., right palpus, retrolateral view.
Fig. 202. Clubiona albicans (Frang.), epigynum.
Fig. 203. Clubiona juana spec. nov., epigynum.
Fig. 204. Clubiona juana spec. nov., right palpus, prolateral view.
Fig. 205. Clubiona maritima L. Koch, left palpus, retrolateral view.
Fig. 206. Clubiona carlota spec. nov., epigynum.
Fig. 207. Clubiona maritima L. Koch, left palpus, dorsal view.
Fig. 208. Clubiona elaver spec. nov., epigynum.
Fig. 209. Aysha turquinensis spec. nov., epigynum.

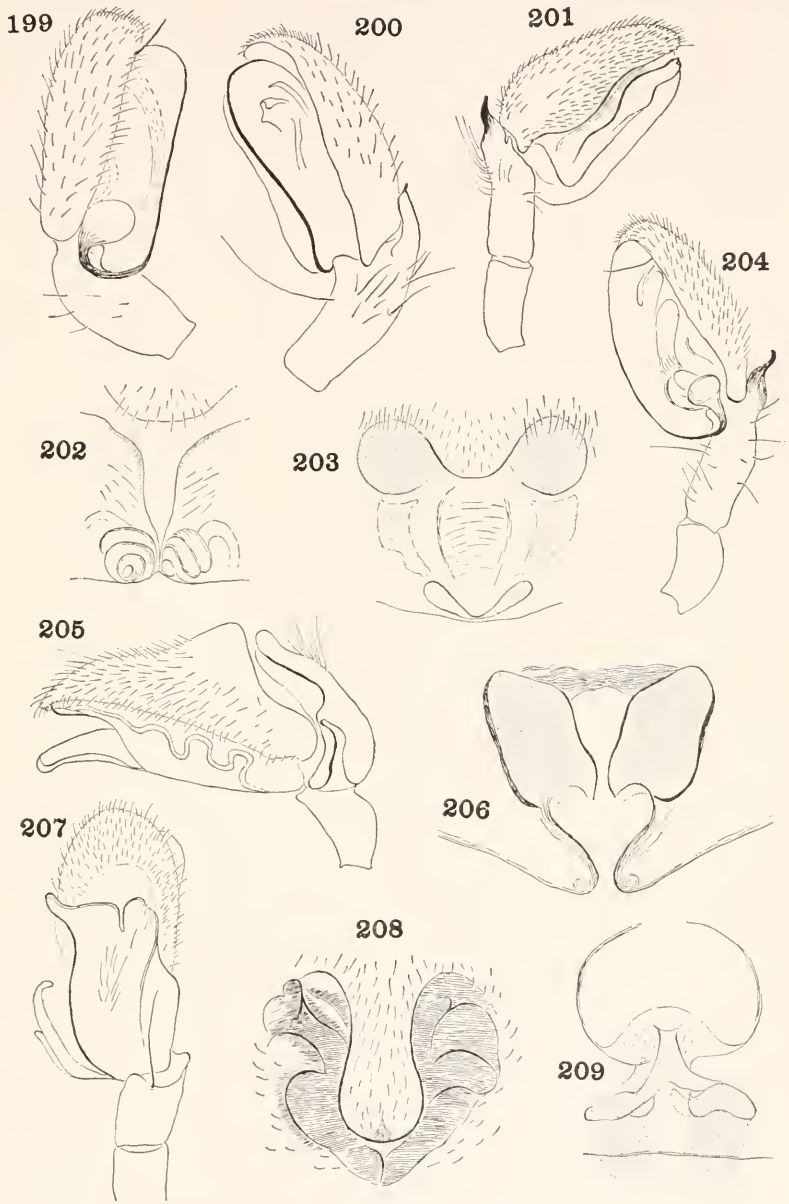
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PLATE 16

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Fig. 210. Anyphaena insulana spec. nov., left palpus, retrolateral view.
Fig. 211. Anyphaena bispinosa spec. nov., left palpus, retrolateral view.
Fig. 212. Anyphaena darlingtoni spec. nov., left palpus, retrolateral view.
Fig. 213. Anyphaenella longipes spec. nov., left palpus, ventral view.
Fig. 214. Anyphaena darlingtoni spec. nov., male, left maxilla.
Fig. 215. Temnida perpusilla (Banks), epigynum.
Fig. 216. Anyphaena darlingtoni spec. nov., male, III metatarsus, ventral view.
Fig. 217. Anyphaenella longipes spec. nov., left palpus, dorsal view.
Fig. 218. Oxysoma cubana Banks, epigynum.
Fig. 219. Anyphaena darlingtoni spec. nov., epigynum.
Fig. 220. Anyphaenella longipes spec. nov. epigynum.
Fig. 221. Anyphaena bispinosa spec. nov., epigynum.
Fig. 222. Oxysoma cubana Banks, left palpus, ventral view.
Fig. 223. Wulfila tricuspis spec. nov., patella and tibia of left palpus, retrolateral view.

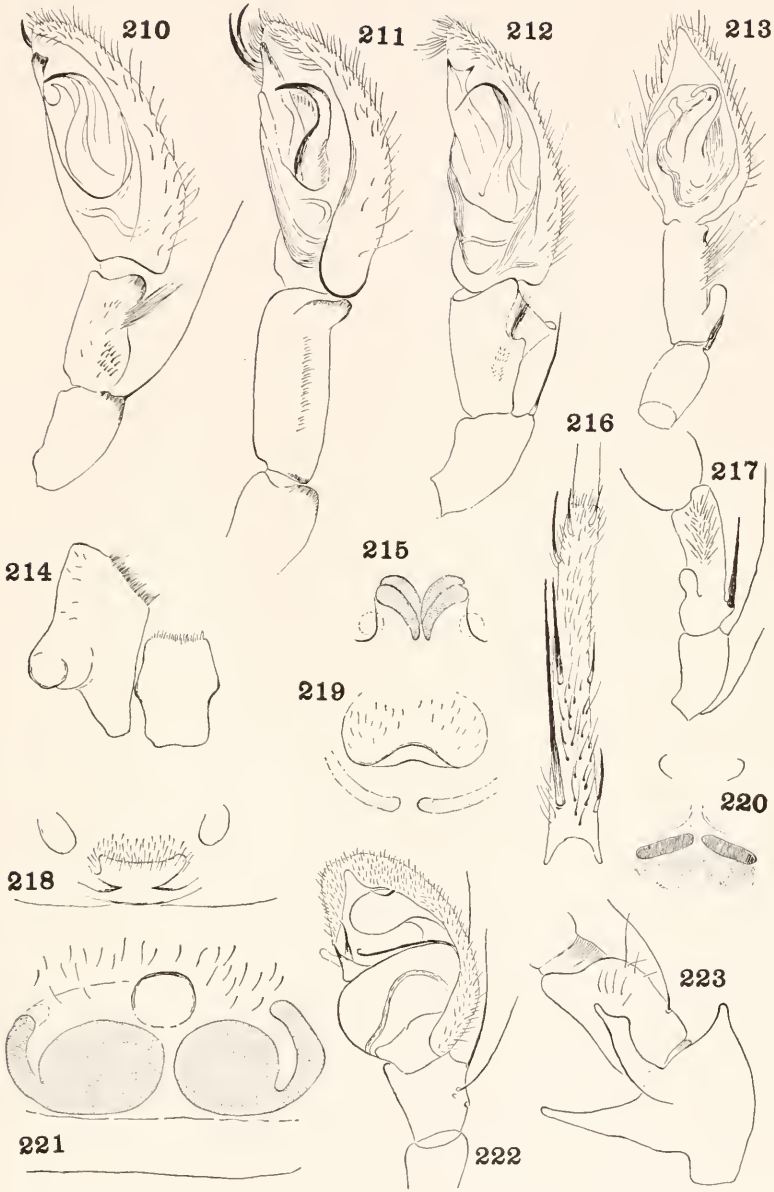
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PLATE 17

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Fig. 224. Trachelas bicolor Keys., left palpus, prolateral view.
Fig. 225. Corinna parvula spec. nov., left palpus, prolateral view.
Fig. 226. Phrurolithus nemoralis spec. nov., epigynum.
Fig. 227. Corinna parvula spec. nov., epigynum.
Fig. 228. Castianeira cubana spec. nov., left palpus, ventral view.
Fig. 229. Liocranum remota spec. nov., epigynum.
Fig. 230. Lyssomanes antillanus Peck., epigynum.
Fig. 231. Thiodina inerma spec. nov., epigynum.
Fig. 232. Castianeira cubana spec. nov., epigynum.
Fig. 233. Trachelas bicolor Keys. male, frontal view of mandibles.
Fig. 234. Oxysoma cubana Banks, female, dorsal view of cephalothorax.
Fig. 235. Trachelas bicolor Keys. epigynum, type.
Fig. 236. Phrurolithus nemoralis spec. nov., left palpus, retrolateral view.

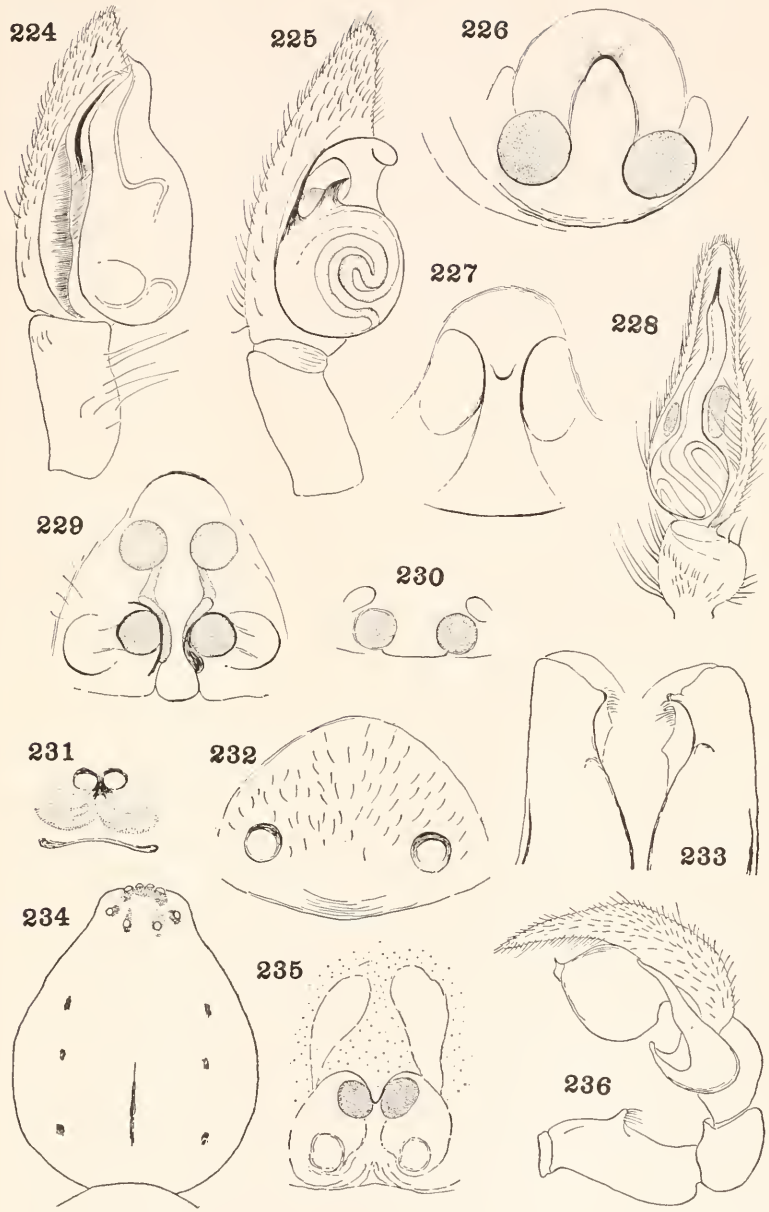
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PLATE 18

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Fig. 237. Lyssomanes antillanus Peck., left palpus, ventral view.
Fig. 238. Nilacantha peckhami spec. nov., left palpus, retrolateral view.
Fig. 239. Thiodina inerma spec. nov., left palpus, retrolateral view.
Fig. 240. Sidusa turquinensis spec. nov., left palpus, ventral view.
Fig. 241. Siloca minuta spec. nov., left palpus, ventral view.
Fig. 242. Siloca cubana spec. nov., left palpus, ventral view.
Fig. 243. Siloca cubana spec. nov., left mandible, ventral view.
Fig. 244. Synemosyna smithii Peck., left palpus, ventral view.
Fig. 245. Siloca minuta spec. nov., epigynum.
Fig. 246. Synemosyna smithii Peck., left palpus, dorsal view.
Fig. 247. Balmaceda peckhami spec. nov., epigynum.
Fig. 248. Sidusa turquinensis spec. nov., epigynum.
Fig. 249. Siloca minuta spec. nov., left palpus, ventral view.
Fig. 250. Sidusa inconspicua spec. nov., epigynum.

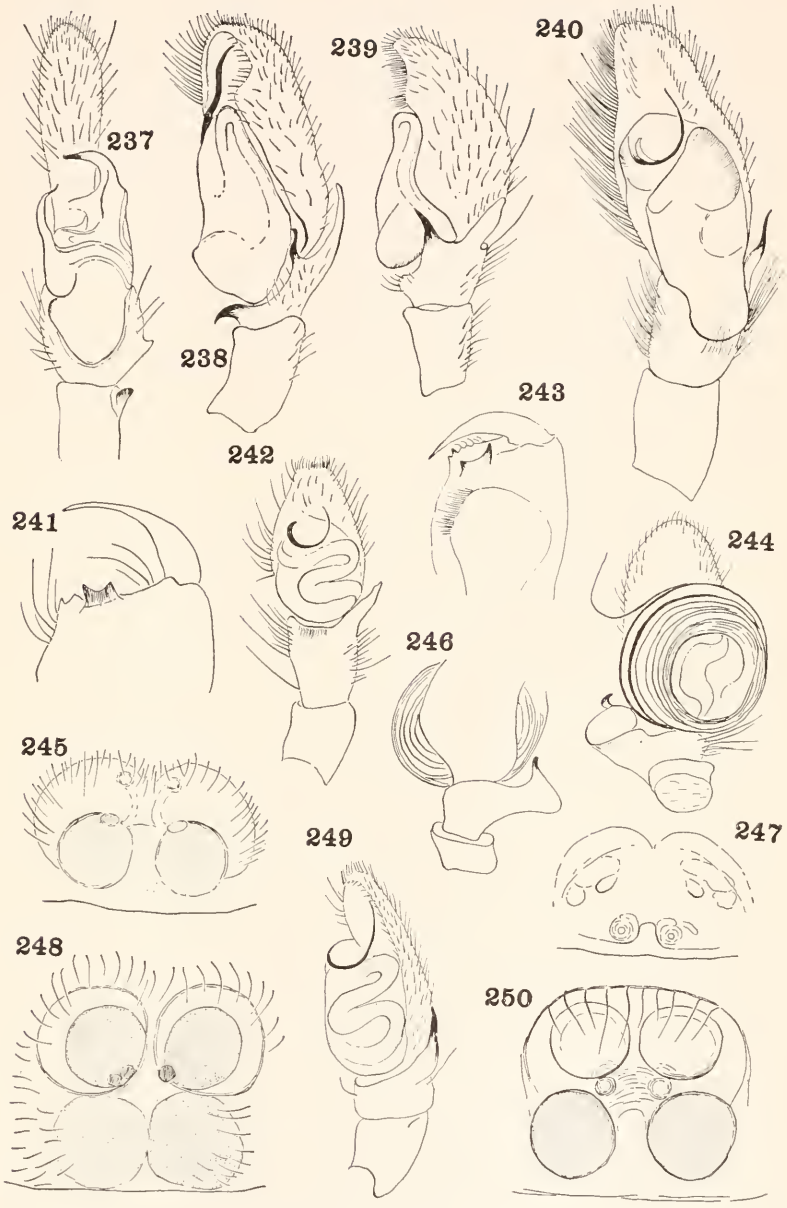
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PLATE 19

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Fig. 251. Balmaceda peckhami spec. nov., female, 1 left leg, prolateral view.
Fig. 252. Agobardus cubensis (Frang.), epigynum.
Fig. 253. Agobardus cubensis (Frang.), male, left mandible, ventral view.
Fig. 254. Agobardus keyserlingi spec. nov., male, dorsal view of left mandible.
Fig. 255. Agobardus keyserlingi spec. nov., male, ventral view of left mandible.
Fig. 256. Agobardus cubensis (Frang.) left palpus, ventral view.
Fig. 257. Agobardus keyserlingi spec. nov., epigynum.
Fig. 258. Agobardus mundus spec. nov., epigynum.
Fig. 259. Agobardus keyserlingi spec. nov., left palpus ventral view.
Fig. 260. Agobardus mundus spec. nov., male, ventral view of left mandible.

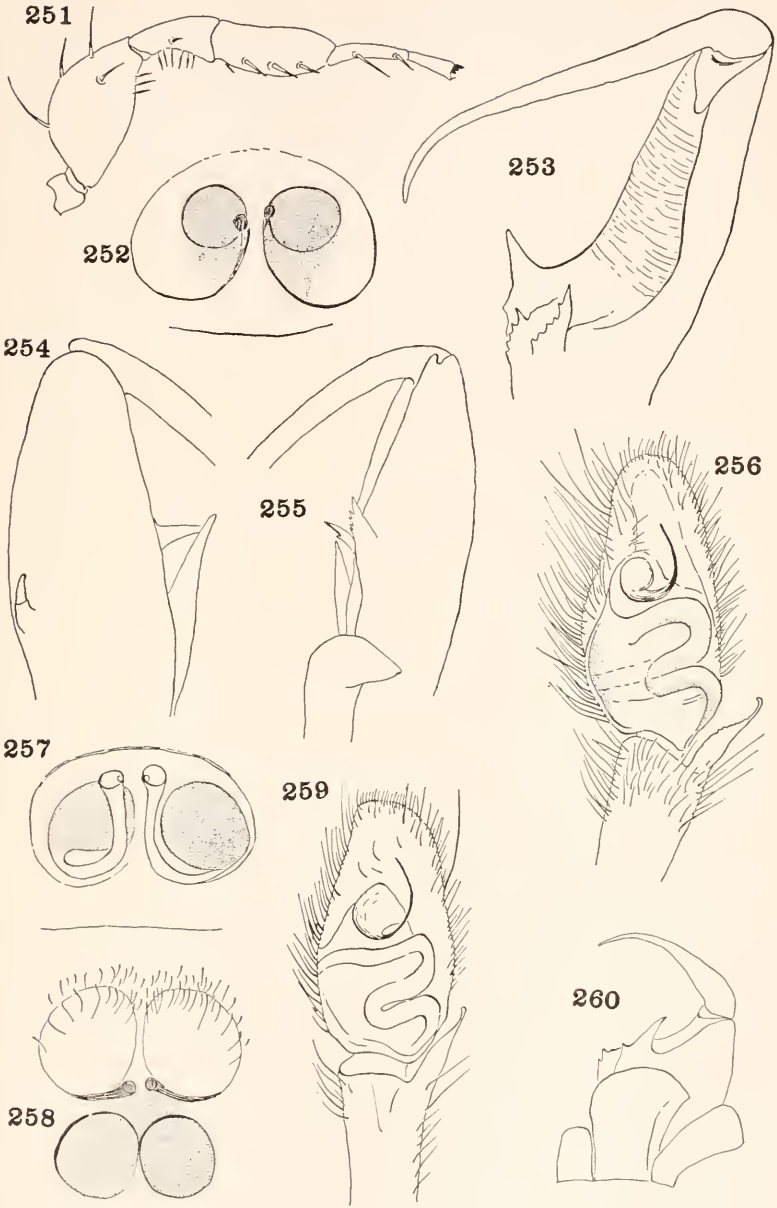
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PLATE 20

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Fig. 261. Agobardus prominens spec. nov., male, ventral view of left mandible.

Fig. 262. Agobardus mandibulatus spec. nov., left palpus, ventral view.

Fig. 263. Agobardus mandibulatus spec. nov.. male, ventral view of left mandible.

Fig. 264. Agobardus mundus spec. nov., left palpus, ventral view.

Fig. 265. Zygoballus concolor spec. nov., epigynum.

Fig. 266. Agobardus prominens spec. nov., male, dorsal view of left mandible.

Fig. 267. Agobardus prominens spec. nov., epigynum.

Fig. 268. Agobardus mandibulatus spec. nov., epigynum.

Fig. 269. Agobardus mandibulatus spec. nov., male, ventral view of left mandible.

Fig. 270. Corythalia emertoni spec. nov., epigynum.

Fig. 271. Agobardus prominens spec. nov., left palpus, ventral view.

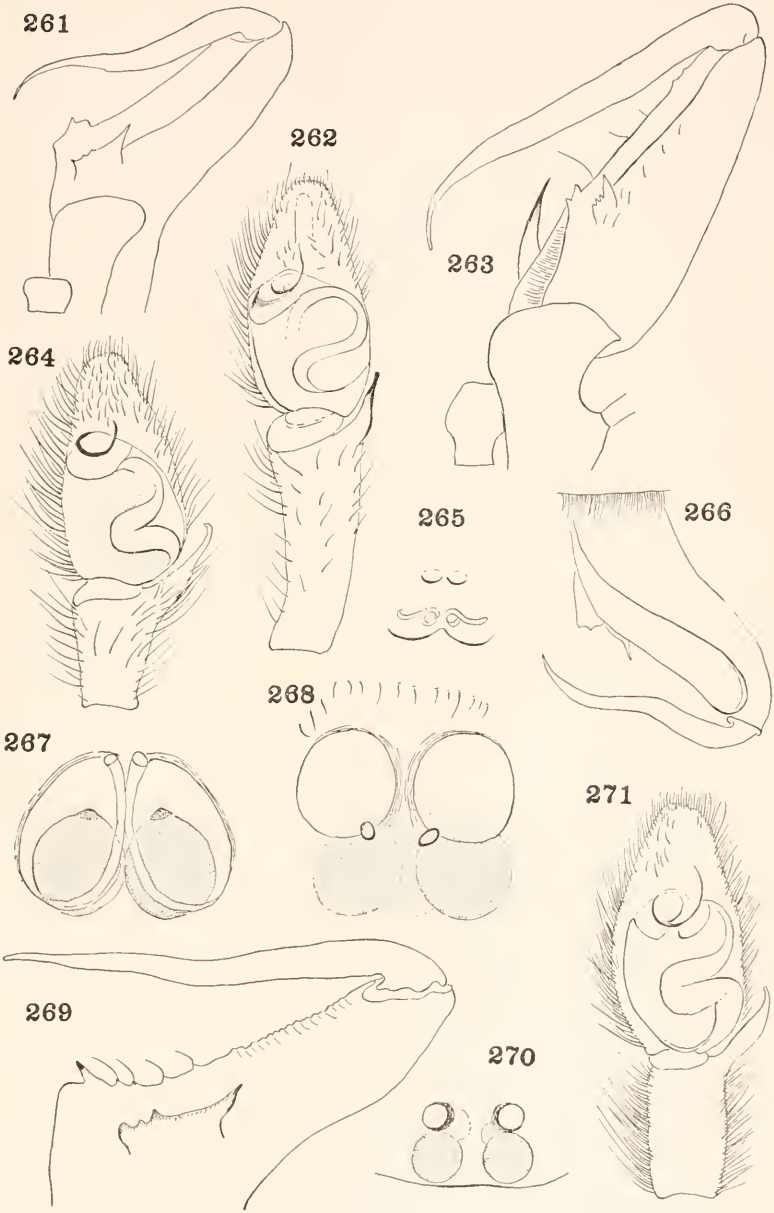
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PLATE 21

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Fig. 272. Zygoballus concolor spec. nov., left palpus, retrolateral view.
Fig. 273. Zygoballus concolor spec. nov., male, ventral view of left mandible.
Fig. 274. Corythalia emertoni spec. nov., left palpus, ventral view.
Fig. 275. Corythalia arcuata Frang., left palpus, ventral view.
Fig. 276. Corythalia arcuata Frang., epigynum.
Fig. 277. Corythalia squamata spec. nov., left palpus, ventral view.
Fig. 278. Corythalia squamata spec. nov., left palpus, retrolateral view.
Fig. 279. Corythalia emertoni spec. nov., left palpus, retrolateral view.
Fig. 280. Corythalia parvula (Banks), left palpus, ventral view.
Fig. 281. Corythalia parvula (Banks), epigynum.
Fig. 282. Corythalia parvula (Banks), tibia of left palpus, prolateral view.
Fig. 283. Pardessus formosus spec. nov., left palpus, ventral view.
Fig. 284. Pardessus formosus spec. nov., male, dorsal view of cephalothorax.

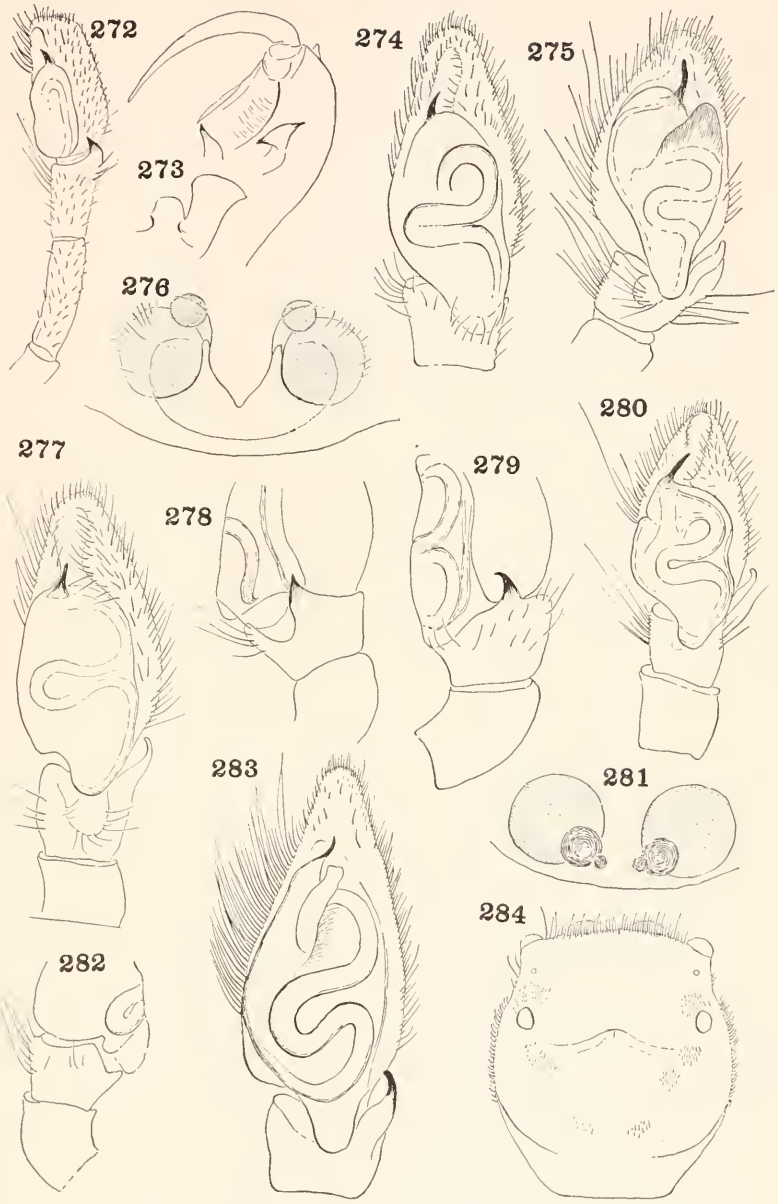
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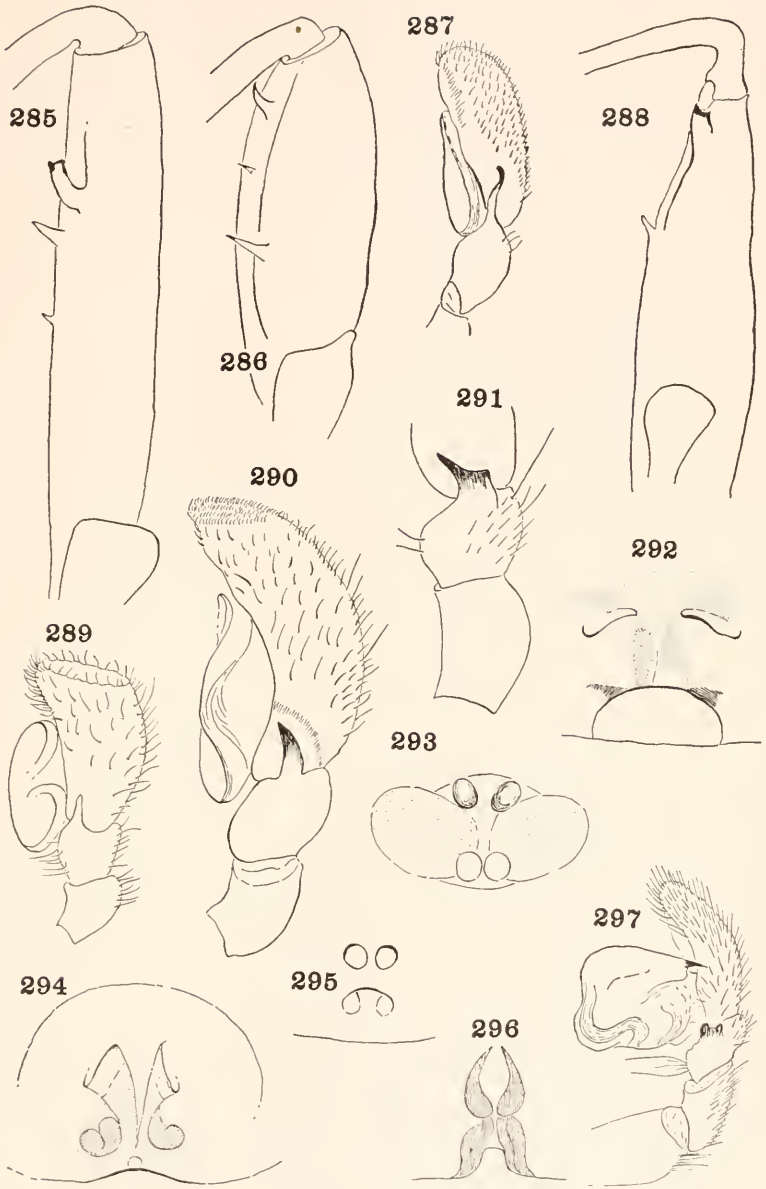
PLATE **22**

PLATE 22

Fig. 285. Hentzia antillana spec. nov., male, ventral view of left mandible.
Fig. 286. Hentzia audax spec. nov., male, ventral view of left mandible.
Fig. 287. Hentzia vernalis (Peck.), left palpus, retrolateral view.
Fig. 288. Hentzia vernalis (Peck.), male, ventral view of left mandible.
Fig. 289. Hentzia antillana spec. nov., left palpus, retrolateral view.
Fig. 290. Hentzia audax spec. nov., left palpus, retrolateral view.
Fig. 291. Hentzia tibialis spec. nov., left palpus, retrolateral view.
Fig. 292. Hentzia audax spec. nov., epigynum.
Fig. 293. Neon nigriceps spec. nov., epigynum.
Fig. 294. Hentzia antillana spec. nov., epigynum.
Fig. 295. Hentzia tibialis spec. nov., epigynum.
Fig. 296. Icius wickhami Peck. epigynum.
Fig. 297. Neon nigriceps spec. nov., left palpus, retrolateral view.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